EXHIBIT P3

JSA SEWER AUTHORITY ACT 537 PLAN

East Norriton-Plymouth-Whitpain
Joint Sewer Authority
Act 537
Sewage Facilities Plan

Submitted January 2007

P.N. 5469.00

Prepared by:

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COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WATER SUPPLY AND WASTEWATER MANAGEMENT

Instructions for Completing Act 537 Plan Content and Environmental Assessment Checklist

Remove and recycle these instructions prior to submission

NOTE: Important information about this checklist...

- *A Guide for Preparing Act 537 Update Revisions* (DEP ID. 362-0300-003) dated February 1998, is currently under revision. While it is available electronically on DEP's website at www.dep.state.pa.us, **DO NOT** use checklist pages from the 1998 document.

  Until such time that revisions to *A Guide for Preparing Act 537 Update Revisions* can be completed to more fully discuss the requirement, wastewater projects proposing funding through the following sources must prepare an "Environmental Report" as described in the Uniform Environmental Review Process (UER) and include it with the plan submission. The following funding programs use the UER process.

  - The Clean Water State Revolving Loan Fund (PENNVEST, DEP, EPA)
  - The RUS Water and Waste Disposal Grant and Loan Program (USDA-RD)
  - The Community Development Block Grant Program (DCED, HUD)
  - Other Federal Funding Efforts (EPA)

- The *Uniform Environmental Review Process* (UER) (DEP ID. 381-5511-111) is available electronically on DEP's website at www.dep.state.pa.us.

CHECKLIST INSTRUCTIONS

These instructions are designed to assist the applicant in completing the Act 537 Plan Content and Environmental Assessment Checklist.

This checklist is composed of three parts; one for "General Information"; one for "Administrative Completeness" and one for "General Plan Content". A plan must be "administratively complete" in order to be formally reviewed by DEP. The General Plan Content portion of the checklist identifies each of the issues that must be addressed in your Act 537 Plan Update based on the pre-planning meeting between you and/or your consultant and DEP.

Use the right-hand column blanks in the checklist to identify the page in the plan on which each planning issue is found or to reference a previously approved update or special study (title and page number).

If you determine a planning issue is not applicable even though it was previously thought to be needed, please explain your decision within the text of the plan (or as a footnote) and indicate the page number where this documentation is found.

When information required as part of an official plan update revision has been developed separately or in a previous update revision, incorporate the information by reference to the planning document and page.

For specific details covering the Act 537 planning requirements, refer to Chapters 71 and 73 of DEP's regulations.

After Municipal Adoption by Resolution, submit three copies of the plan, any attachments or addenda and this checklist to DEP.

A copy of this completed checklist must be included with your Act 537 plan. DEP will use the "DEP USE ONLY" column during the completeness evaluation of the plan. This column may also be used by DEP during the pre-planning meeting with the municipality to identify planning elements which are not required to be included in the plan.

PART 1 GENERAL INFORMATION

A. Project Information (See Section A of instructions)

1. Project Name: East Norriton-Plymouth-Whitpain Joint Sewer Authority (ENPWJSA) Act 537 Plan

2. Brief Project Description: Preparation of an Act 537 Plan for proposed upgrades to the Authority's wastewater treatment plant located at 200 Ross Street in Plymouth Township

B. Client (Municipality) Information (See Section B of instructions)

Municipality Name	County	City	Boro	Twp
ENPWJSA	Montgomery	☐	☐	☐

Municipality Contact Individual - Last Name	First Name	MI	Suffix	Title
Boyd	Timothy	A.		Executive Director
Additional Individual Last Name	First Name	MI	Suffix	Title

Municipality Mailing Address Line 1	Mailing Address Line 2
200 Ross Street	

Address Last Line -- City	State	ZIP+4
Plymouth Meeting	PA	19462-2740

Phone + Ext.	FAX (optional)	Email (optional)
610-279-5759	610-279-8033	

C. Site Information (See Section C of instructions)

Site (or Project) Name
ENPWJSA WWTP ENPWJSA (Municipal Name) Act 537 Plan

Site Location Line 1	Site Location Line 2
200 Ross Street Plymouth Meeting, PA 19462	

D. Project Consultant Information (See Section D of instructions)

Last Name	First Name	MI	Suffix
Bohner	William	L.	Jr.

Title	Consulting Firm Name
Project Engineer	ARRO Consulting, Inc.

Mailing Address Line 1	Mailing Address Line 2
649 N. Lewis Road	Suite 100

Address Last Line – City	State	ZIP+4	Country
Limerick	PA	19468-1234	USA

Email	Phone 610-495-2102	Ext.	FAX 610-495-5855

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PART 2 ADMINISTRATIVE COMPLETENESS CHECKLIST

DEP Use Only	Indicate Page #(s) in Plan	In addition to the main body of the plan, the plan must include items one through eight listed below to be accepted for formal review by the department. Incomplete Plans will be returned unless the municipality is clearly requesting an advisory review.
_____	Front of Plan	1. Table of Contents 2. Plan Summary
_____	ES-1,2,3	A. Identify the proposed service areas and major problems evaluated in the plan. (Reference - Title 25, §71.21.a.7.i).
_____	ES-1,2,3	B. Identify the alternative(s) chosen to solve the problems and serve the areas of need identified in the plan. Also, include any institutional arrangements necessary to implement the chosen alternative(s). (Reference Title 25 §71.21.a.7.ii).
_____	ES-1,2,3	C. Present the estimated cost of implementing the proposed alternative (including the user fees) and the proposed funding method to be used. (Reference Title 25, §71.21.a.7.ii).
_____	ES-1,2,3	D. Identify the municipal commitments necessary to implement the Plan. (Reference Title 25, §71.21.a.7.iii).
_____	ES-1,2,3	E. Provide a schedule of implementation for the project which identifies the MAJOR milestones with dates necessary to accomplish the project to the point of operational status. (Reference Title 25, §71.21.a.7.iv).
_____	Appendix Q	3. Original, signed and sealed Resolution of Adoption by the municipality which contains, at a minimum, alternatives chosen and a commitment to implement the Plan in accordance with the implementation schedule. (Reference Title 25, §71.31.f) Section V.F. of the Planning Guide.
_____	Appendix N and M	4. Evidence that the municipality has requested, reviewed and considered comments by appropriate official planning agencies of the municipality, planning agencies of the county, planning agencies with areawide jurisdiction (where applicable), and any existing county or joint county departments of health. (Reference-Title 25, §71.31.b) Section V.E.1 of the Planning Guide.
_____	Appendix O	5. Proof of Public Notice which documents the proposed plan adoption, plan summary, and the establishment and conduct of a 30 day comment period. (Reference-Title 25, §71.31.c) Section V.E.2 of the Planning Guide.
_____	Appendix M and N	6. Copies of ALL written comments received and municipal response to EACH comment in relation to the proposed plan. (Reference-Title 25, §71.31.c) Section V.E.2 of the Planning Guide.
_____	Appendix B	7. A complete project implementation schedule with milestone dates specific for each existing and future area of need. Other activities in the project implementation schedule should be indicated as occurring a finite number of days from a major milestone. (Reference-Title 25, §71.31.d) Section F of the Planning Guide. Include dates for the future initiation of feasibility evaluations in the project's implementation schedule for areas proposing completion of sewage facilities for planning periods in excess of five years. (Reference Title 25, §71.21.b).
_____	Appendix J and K	8. Documentation indicating that the appropriate agencies have received, reviewed and concurred with the method proposed to resolve identified inconsistencies within the proposed alternative and consistency requirements in 71.21.(a)(5)(i-iii). (Reference-Title 25, §71.31.e). Appendix B of the Planning Guide.

PART 3 GENERAL PLAN CONTENT CHECKLIST

DEP Use Only	Indicate Page #(s) in Plan		Item Required
____	1 and Appendix C	I.	**Previous Wastewater Planning**
		A.	Identify and briefly analyze all existing wastewater planning that:
____	1 and Appendix C		1. Has been previously undertaken under the Sewage Facilities Act (Act 537). (Reference-Act 537, Section 5 §d.1).
____	1 and Appendix C		2. Has not been carried out according to an approved implementation schedule contained in the plans. ,(Reference-Title 25, §71.21.a.5.i.A-D). Section V.F of the Planning Guide.
____	1 and Appendix C		3. Is anticipated or planned by applicable sewer authorities. (Reference-Title 25, §71.21.a.5.i.A). Section V.D. of the Planning Guide.
____	1 and Appendix C		4. Has been done through planning modules for new land development, planning "exemptions" and addenda. (Reference-Title 25, §71.21.a.5.i.A).
		B.	Identify and briefly summarize all municipal and county planning documents adopted pursuant to the Pennsylvania Municipalities Planning Code (Act 247) including:
____	1 and Appendix C		1. All land use plans and zoning maps which identify residential, commercial, industrial, agricultural, recreational and open space areas. (Reference-Title 25, §71.21.a.3.iv).
____	1 and Appendix C		2. Zoning or subdivision regulations that establish lot sizes predicated on sewage disposal methods. (Reference-Title 25 §71.21.a.3.iv).
____	1 and Appendix C		3. All limitations and plans related to floodplain and stormwater management and special protection (Ch. 93) areas. (Reference-Title 25 §71.21.a.3.iv) Appendix B, Section II.F of the Planning Guide.
		II.	**Physical and Demographic Analysis utilizing written description and mapping** (All items listed below require maps, and all maps should show all current lots and structures and be of appropriate scale to clearly show significant information).
____	2 and Appendix C	A.	Identification of planning area(s), municipal boundaries, Sewer Authority/Management Agency service area boundaries. (Reference-Title 25, §71.21.a.1.i).
____	2 and Appendix C	B.	Identification of physical characteristics (streams, lakes, impoundments, natural conveyance, channels, drainage basins in the planning area). (Reference-Title 25, §71.21.a.1.ii).
____	2 and Appendix C	C.	Soils - Analysis with description by soil type and soils mapping. Show areas suitable for in-ground onlot systems, elevated sand mounds, individual residential spray irrigation systems, and areas unsuitable for soil dependent systems. (Reference-Title 25, §71.21.a.1.iii). Show Prime Agricultural Soils and any locally protected agricultural soils. (Reference-Title 25, §71.21.a.1.iii).
____	2 and Appendix C	D.	Geologic Features - (1) Identification through analysis, (2) mapping and (3) their relation to existing or potential nitrate-nitrogen pollution and drinking water sources. Include areas where existing nitrate-nitrogen levels are in excess of five mg/l. (Reference-Title 25, §71.21.a.1.iii).

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_____	2 and Appendix C	E. Topography - Depict slopes that are suitable for conventional systems; slopes that are suitable for elevated sand mounds; slopes that are unsuitable for on-lot systems. (Reference-Title 25, §71.21.a.1.ii).
_____	2 and Appendix C	F. Potable Water Supplies - Identification through mapping, description and analysis to include available public water supply capacity and aquifer yield for groundwater supplies. (Reference-Title 25 §71.21.a.1.vi). Section V.C. of the Planning Guide.
_____	2 and Appendix C	G. Wetlands-Identify wetlands as defined in Title 25, Chapter 105 by description, analysis and mapping. Include National Wetland Inventory mapping and potential wetland areas per USDA, SCS mapped hydric soils. Proposed collection, conveyance and treatment facilities and lines must be located and labeled, along with the identified wetlands, on the map. (Reference-Title 25, §71.21.a.1.v). Appendix B, Section II.I of the Planning Guide.
		III. Existing Sewage Facilities in the Planning Area - Identifying the Existing Needs
		A. Identify, map and describe municipal and non-municipal, individual and community sewerage systems in the planning area including:
_____	3	1. Location, size and ownership of treatment facilities, main intercepting lines, pumping stations and force mains including their size, capacity, point of discharge. Also include the name of the receiving stream, drainage basin, and the facility's effluent discharge requirements. (Reference-Title 25, §71.21a.2.i.A).
_____	3	2. A narrative and schematic diagram of the facility's basic treatment processes including the facility's NPDES permitted capacity, and the Clean Streams Law permit number. (Reference-Title 25, §71.21.a.2.i).
_____	4	3. A description of problems with existing facilities (collection, conveyance and/or treatment), including existing or projected overload under Title 25, Chapter 94 (relating to municipal wasteload management) or violations of the NPDES permit, Clean Streams Law permit, or other permit, rule or regulation of the department. (Reference-Title 25, §71.21.a.2.i.B).
_____	4	4. Details of scheduled or in-progress upgrading or expansion of treatment facilities and the anticipated completion date of the improvements. Discuss any remaining reserve capacity and the policy concerning the allocation of reserve capacity. Also discuss the compatibility of the rate of growth to existing and proposed wastewater treatment facilities. (Reference-Title 25, §71.21.a.4.i & ii).
_____	8	5. A detailed description of operation and maintenance requirements of the municipality for on-lot systems and the status of past and present compliance with these requirements and any other requirements relating to sewage management programs. (Reference-Title 25, §71.21.a.2.i.C).
_____	8	6. Disposal areas, if other than stream discharge, and any applicable groundwater limitations. (Reference-Title 25, §71.21.a.4.i & ii).

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		B. Using DEP's manual titled *Sewage Disposal Needs Identification*, identify, map and describe areas that utilize individual and community onlot sewage disposal and, unpermitted collection and disposal systems ("wildcat" sewers, borehole disposal, etc.) and retaining tank systems in the planning area including:
_____	8 and Appendix C	1. The types of systems in use. (Reference-Title 25, §71.21.a.2.ii.A).
_____	8 and Appendix C	2. A sanitary survey complete with a description of documented and potential public health pollution, and operational problems (including malfunctioning systems) with the systems, including violations of local ordinances, the Sewage Facilities Act, the Clean Stream Law or regulations promulgated thereunder. (Reference-Title 25, §71.21.a.2.ii.B).
_____	8 and Appendix C	3. A comparison of the types of on-lot sewage systems installed in an area with the types of systems which are appropriate for the area according to soil, geologic conditions, topographic limitations sewage flows, and Title 25 Chapter 73 (relating to standards for sewage disposal facilities). (Reference-Title 25, §71.21.a.2.ii.C).
_____	8 and Appendix C	4. An individual water supply survey to identify possible contamination by malfunctioning on-lot sewage disposal systems consistent with DEP's *Sewage Disposal Needs Identification* manual. (Reference-Title 25 §71.21.a.2.ii.B).
		C. Identify wastewater sludge and septage generation, transport and disposal methods. Include this information in the sewage facilities alternative analysis including:
_____	8 and Appendix C	1. Location of sources of wastewater sludge or septage (Septic tanks, holding tanks, wastewater treatment facilities). (Reference-Title 25 §71.71).
_____	8 and Appendix C	2. Quantities of the types of sludges or septage generated. (Reference-Title 25 §71.71).
_____	8 and Appendix C	3. Present disposal methods, locations, capacities and transportation methods. (Reference-Title 25 §71.71).
		IV. Future Growth and Land Development
		A. Delineate and describe the following through map, text and analysis:
_____	9 and Appendix C	1. Areas with existing development or plotted subdivisions. Include the name, location, description, total number of EDU's in development, total number of EDU's currently developed and total number of EDUs remaining to be developed (include time schedule for EDU's remaining to be developed). (Reference-Title 25, §71.21.a.3.i).
_____	9 and Appendix C	2. Land use designations established under the Pennsylvania Municipalities Planning Code (35 P.S. 10101-11202), including residential, commercial and industrial areas. (Reference-Title 25,§71.21.a.3.ii). Include a comparison of proposed land use as allowed by zoning and existing sewage facility planning. (Reference-Title 25, §71.21.a.3.iv).
_____	9 and	3. Future growth areas with population and EDU projections for these areas

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	Appendix C	using historical, current and future population figures and projections of the municipality. Discuss and evaluate discrepancies between local, county, state and federal projections as they relate to sewage facilities. (Reference-Title 25, §71.21.a.1.iv). (Reference-Title 25, §71.21.a.3.iii).

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_____	9 and Appendix C	4. Zoning, and/or subdivision regulations; local, county or regional comprehensive plans; and existing plans of a Commonwealth agency relating to the development, use and protection of land and water resources with special attention to: (Reference-Title 25, §71.21.a.3.iv). --public ground/surface water supplies --recreational water use areas --groundwater recharge areas --industrial water use --wetlands
_____	9 and Appendix C	5. Sewage planning to provide adequate wastewater treatment for the municipality. This planning must be related to both the five and ten year future planning periods and be based on growth impacts on existing and proposed wastewater collection and treatment facilities. (Reference-Title 25, §71.21.a.3.v).
		V. Identify Alternatives to Provide New or Improved Wastewater Disposal Facilities
		A. Conventional collection, conveyance, treatment and discharge alternatives including:
_____	10	1. The potential for regional wastewater treatment. (Reference-Title 25, §71.21.a.4).
_____	11	2. The potential for extension of existing municipal or non-municipal sewage facilities to areas in need of new or improved sewage facilities. (Reference-Title 25, §71.21.a.4.i).
		3. The potential for the continued use of existing municipal or non-municipal sewage facilities through one or more of the following: (Reference-Title 25, §71.21.a.4.ii).
_____	11-22	a. Repair. (Reference-Title 25, §71.21.a.4.ii.A).
_____	11-22	b. Upgrading. (Reference-Title 25, §71.21.a.4.ii.B).
_____	11-22	c. Reduction of hydraulic or organic loading to existing facilities. (Reference-Title 25, §71.71).
_____	11-22	d. Improved operation and maintenance. (Reference-Title 25, §71.21.a.4.ii.C).
_____	11-22	e. Other applicable actions that will resolve or abate the identified problems. (Reference-Title 25, §71.21.a.4.ii.D).
_____	23	4. The need for construction of new community sewage systems including sewer systems and/or treatment facilities. (Reference-Title 25, §71.21.a.4.iii).
_____	23	5. Repair or replacement of collection and conveyance system components. (Reference-Title 25, §71.21.a.4.ii.A).

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_____	23	6. Use of innovative/alternative methods of collection/conveyance to serve needs areas using existing wastewater treatment facilities. (Reference-Title 25, §71.21.a.4.ii.B).

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		B. The use of individual sewage disposal systems including individual residential spray irrigation systems based on:
_____	25	1. Soil and slope suitability. (Reference-Title 25, 71.21.a.2.ii.C).
_____	25	2. Preliminary hydrogeologic evaluation. (Reference-Title 25, §71.21.a.2.ii.C).
_____	25	3. The establishment of a sewage management program. (Reference-Title 25, §71.21.a.4.iv). See also Part "F" below.
		4. The repair, replacement or upgrading of existing malfunctioning systems in areas suitable for onlot disposal considering: (Reference-Title 25, §71.21.a.4).
_____	25	a. Existing technology and sizing requirements of Title 25 Chapter 73. (Reference-Title 25, §73.31-73.72).
_____	25	b. Use of expanded absorption areas or alternating absorption areas. (Reference-Title 25, §73.16).
_____	25	c. Use of water conservation devices. (Reference-Title 25, §71.73.b.2.iii).
		C. The use of small flow sewage treatment facilities or package treatment facilities to serve individual homes or clusters of homes based on: (Reference-Title 25, §71.64.d).
_____	26	1. Treatment and discharge requirements. (Reference-Title 25, §71.64.d).
_____	26	2. Soil suitability. (Reference-Title 25, §71.64.c.l).
_____	26	3. Preliminary hydrogeologic evaluation. (Reference-Title 25, §71.64.c.2).
_____	26	4. Agency or other controls over operation and maintenance requirements. (Reference-Title 25, §71.64.d). See Part "F" below.
		D. The use of community land disposal alternatives including:
_____	26	1. Soil and site suitability. (Reference-Title 25, 71.21.a.2.ii.C).
_____	26	2. Preliminary hydrogeologic evaluation. (Reference-Title 25, 71.21.a.2.ii.C).
_____	26	3. Controls over operation and maintenance requirements through a Sewage Management Program (Reference-Title25, 71.21.a.2.ii.C). See Part "F" below.
_____	26	4. The rehabilitation or replacement of existing malfunctioning community land disposal systems. (See Part V, B, 4, a, b, c above). See also Part "F" below.
		E. The use of retaining tank alternatives on a temporary or permanent basis including: (Reference- Title 25, §71.21.a.4).
_____	26	1. Commercial, residential and industrial use. (Reference-Title 25, §71.63.e).
_____	26	2 Designated conveyance facilities (pumper trucks). (Reference-Title 25, §71.63.b.2).
_____	26	3. Designated treatment facilities or disposal site. (Reference-Title 25, 71.63.b.2).
_____	26	4. Implementation of a retaining tank ordinance by the municipality. (Reference-Title 25, §71.63.b.2). See Part "F" below.

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____	26	5. Financial guarantees when retaining tanks are used as an interim sewage disposal measure. (Reference-Title 25, §71.63.c.2).
		F. Sewage management programs to assure the future operation and maintenance of existing and proposed sewage facilities through:
____	26	1. Municipal ownership or control over the operation and maintenance of individual onlot sewage disposal systems, small flow treatment facilities, or other traditionally non-municipal treatment facilities. (Reference-Title 25, §71.21.a.4.iv).
____	26	2. Required inspection of sewage disposal systems on a schedule established by the municipality. (Reference-Title 25, §71.73.b.1.).
____	26	3. Required maintenance of sewage disposal systems including septic and aerobic treatment tanks and other system components on a schedule established by the municipality. (Reference-Title 25, §71.73.b.2).
____	26	4. Repair, replacement or upgrading of malfunctioning onlot sewage systems. (Reference-Title 25, §71.21.a.4.iv) through:
____	26	a. Aggressive pro-active enforcement of ordinances which require operation and maintenance and prohibit malfunctioning systems. (Reference-Title 25, §71.73.b.5).
____	26	b. Public education programs to encourage proper operation and maintenance and repair of sewage disposal systems.
____	26	5. Establishment of joint municipal sewage management programs. (Reference-Title 25, §71.73.b.8).
____	26	6. Requirements for bonding, escrow accounts, management agencies or associations to assure operation and maintenance for non-municipal facilities. (Reference-Title 25, §71.71).
		G. Non-structural comprehensive planning alternatives that can be undertaken to assist in meeting existing and future sewage disposal needs including: (Reference-Title 25, §71.21.a.4).
		1. Modification of existing comprehensive plans involving:
____	26	a. Land use designations. (Reference-Title 25, §71.21.a.4).
____	26	b. Densities. (Reference-Title 25, §71.21.a.4).
____	26	c. Municipal ordinances and regulations. (Reference-Title 25, §71.21.a.4).
____	26	d. Improved enforcement. (Reference-Title 25, §71.21.a.4).
____	26	e. Protection of drinking water sources. (Reference-Title 25, §71.21.a.4).
____	26	2. Consideration of a local comprehensive plan to assist in producing sound economic and consistent land development. (Reference-Title 25, §71.21.a.4).
____	26	3. Alternatives for creating or changing municipal subdivision regulations to assure long-term use of on-site sewage disposal which consider lot sizes and protection of replacement areas. (Reference-Title 25, §71.21.a.4).
____	26	4. Evaluation of existing local agency programs and the need for technical or administrative training. (Reference-Title 25, §71.21.a.4).

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_____	27	H. A no-action alternative which includes discussion of both short-term and long-term impacts on: (Reference-Title 25, §71.21.a.4).
_____	27	1. Water Quality/Public Health. (Reference-Title 25, §71.21.a.4).
_____	27	2. Growth potential (residential, commercial, industrial). (Reference-Title 25, 71.21.a.4).
_____	27	3. Community economic conditions. (Reference-Title 25, 71.21.a.4).
_____	28	4. Recreational opportunities. (Reference-Title 25, §71.21.a.4).
_____	28	5. Drinking water sources. (Reference-Title 25, §71.21.a.4).
_____	28	6. Other environmental concerns. (Reference-Title 25, 71.21.a.4).
		VI. Evaluation of Alternatives
		A. Technically feasible alternatives identified in Section V of this check-list must be evaluated for consistency with respect to the following: (Reference-Title 25, §71.21.a.5.i.A).
_____	30	1. Applicable plans developed and approved under Sections 4 and 5 of the Clean Streams Law or Section 208 of the Clean Water Act (33 U.S.C.A. 1288). (Reference-Title 25, §71.21.a.5.i.A). Appendix B, Section II.A of the Planning Guide.
_____	30	2. Municipal wasteload management plans developed under PA Code, Title 25, Chapter 94. (Reference-Title 25, §71.21.a.5.i.B). The municipality's recent Wasteload Management (Chapter 94) Reports should be examined to determine if the proposed alternative is consistent with the recommendations and findings of the report. Appendix B, Section II.B of the Planning Guide.
_____	30	3. Plans developed under Title II of the Clean Water Act (33 U.S.C.A. 1281-1299) or Titles II and VI of the Water Quality Act of 1987 (33 U.S.C.A 1251-1376). (Reference-Title 25, §71.21.a.5.i.C). Appendix B, Section II.E of the Planning Guide.
_____	31	4. Comprehensive plans developed under the Pennsylvania Municipalities Planning Code. (Reference-Title 25, §71.21.a.5.i.D). The municipality's comprehensive plan must be examined to assure that the proposed wastewater disposal alternative is consistent with land use and all other requirements stated in the comprehensive plan. Appendix B, Section II.D of the Planning Guide.
_____	31	5. Antidegradation requirements as contained in PA Code, Title 25, Chapters 93, 95 and 102 (relating to water quality standards, wastewater treatment requirements and erosion control) and the Clean Water Act. (Reference-Title 25, §71.21.a.5.i.E). Appendix B, Section II.F of the Planning Guide.
_____	32	6. State Water Plans developed under the Water Resources Planning Act (42 U.S.C.A. 1962-1962 d-18). (Reference-Title 25, §71.21.a.5.i.F). Appendix B, Section II.C of the Planning Guide.
_____	32	7. Pennsylvania Prime Agricultural Land Policy contained in Title 4 of the Pennsylvania Code, Chapter 7, Subchapter W. Provide narrative on local municipal policy and an overlay map on prime agricultural soils. (Reference-Title 25, §71.21.a.5.i.G). Appendix B, Section II.G of the Planning Guide.

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_____	32	8. County Stormwater Management Plans approved by DEP under the Storm Water Management Act (32 P.S. 680.1-680.17). (Reference-Title 25, §71.21.a.5.i.H). Conflicts created by the implementation of the proposed wastewater alternative and the existing recommendations for the management of stormwater in the county Stormwater Management Plan must be evaluated and mitigated. If no plan exists, no conflict exists. Appendix B, Section II.H of the Planning Guide.
_____	32	9. Using wetland mapping developed under Section II.A.7, identify and discuss mitigative measures including the need to obtain permits for any encroachments on wetlands from the construction or operation of any proposed wastewater facilities. Appendix B, Section II.I of the Planning Guide.
_____	32	10. Protection of rare, endangered or threatened plant and animal species as identified by the Pennsylvania Natural Diversity Inventory (PNDI). (Reference-Title 25, §71.21.a.5.i.J). Provide the department with a copy of the completed Request For PNDI Search document. Also provide a copy of the response letter from the Department of Conservation and Natural Resources' Bureau of Forestry regarding the findings of the PNDI search. Appendix B, II.J.
_____	33	11. Historical and archaeological resource protection under P.C.S. Title 37, Section 507 relating to cooperation by public officials with the Pennsylvania Historical and Museum Commission. (Reference-Title 25, §71.21.a.5.i.K). Provide the department with a completed copy of a Cultural Resource Notice request to the Bureau of Historic Preservation (BHP) to provide a listing of known historical sites and potential impacts on known archaeological and historical sites. Also provide a copy of the response letter from the BHP. Appendix B, Section II.K of the Planning Guide.
_____	33	B. Provide for the resolution of any inconsistencies in any of the points identified in Section VI.A. of this checklist by submitting a letter from the appropriate agency stating that the agency has received, reviewed and concurred with the resolution of identified inconsistencies. (Reference-Title 25, §71.21.a.5.ii). Appendix B of the Planning Guide.
_____	33	C. Evaluate alternatives identified in Section V of this checklist with respect to applicable water quality standards, effluent limitations or other technical, legislative or legal requirements. (Reference-Title 25, §71.21.a.5.iii).
_____	34	D. Provide cost estimates using present worth analysis for construction, financing, on going administration, operation and maintenance and user fees for alternatives identified in Section V of this checklist. Estimates shall be limited to areas identified in the plan as needing improved sewage facilities within five years from the date of plan submission. (Reference-Title 25, §71.21.a.5.iv).
_____	35	E. Provide an analysis of the funding methods available to finance the proposed alternatives evaluated in Section V of this checklist. Also provide documentation to demonstrate which alternative and financing scheme combination is the most cost-effective; and a contingency financial plan to be used if the preferred method of financing cannot be implemented. The funding analysis shall be limited to areas identified in the plan as needing improved sewage facilities within five years from the date of the plan submission. (Reference-Title 25, §71.21.a.5.v).

DEP Use Only	Indicate Page #(s) in Plan	Item Required
		F. Analyze the need for immediate or phased implementation of each alternative proposed in Section V of this checklist including: (Reference-Title 25, §71.21.a.5.vi).
____	40	1. A description of any activities necessary to abate critical public health hazards pending completion of sewage facilities or implementation of sewage management programs. (Reference-Title 25, §71.21.a.5.vi.A).
____	40	2. A description of the advantages, if any, in phasing construction of the facilities or implementation of a sewage management program justifying time schedules for each phase. (Reference-Title 25, §71.21.a.5.vi.B).
____	40	G. Evaluate administrative organizations and legal authority necessary for plan implementation. (Reference - Title 25, §71.21.a.5.vi.D.).
		VII. Institutional Evaluation
		A. Provide an analysis of all existing wastewater treatment authorities, their past actions and present performance including:
____	41	1. Financial and debt status. (Reference-Title 25, §71.61.d.2).
____	41	2. Available staff and administrative resources. (Reference-Title 25, §71.61.d.2).
____	41	3. Existing legal authority to:
____	41	a. Implement wastewater planning recommendations. (Reference-Title 25, §71.61.d.2).
____	41	b. Implement system-wide operation and maintenance activities. (Reference-Title 25, §71.61.d.2).
____	41	c. Set user fees and take purchasing actions. (Referernce-Title 25, §71.61.d.2).
____	41	d. Take enforcement actions against ordinance violators. (Reference-Title 25, §71.61.d.2).
____	41	e. Negotiate agreements with other parties. (Reference-Title 25, §71.61.d.2).
____	41	f. Raise capital for construction and operation and maintenance of facilities. (Reference-Title 25,§71.61.d.2).
		B. Provide an analysis and description of the various institutional alternatives necessary to implement the proposed technical alternatives including:
____	42	1. Need for new municipal departments or municipal authorities. (Reference-Title 25, §71.61.d.2).
____	42	2. Functions of existing and proposed organizations (sewer authorities, onlot maintenance agencies, etc.). (Reference-Title 25, §71.61.d.2).
____	42	3. Cost of administration, implementability, and the capability of the authority/agency to react to future needs. (Reference-Title 25, §71.61.d.2).
		C. Describe all necessary administrative and legal activities to be completed and adopted to ensure the implementation of the recommended alternative including:
____	42	1. Incorporation of authorities or agencies. (Reference-Title 25, §71.61.d.2).
____	43	2. Development of all required ordinances, regulations, standards and inter-municipal agreements. (Reference-Title 25, §71.61.d.2).

DEP Use Only	Indicate Page #(s) in Plan	Item Required
____	45	3. Description of activities to provide rights-of-way, easements and land transfers. (Reference-Title 25, §71.61.d.2).
____	45	4. Adoption of other municipal sewage facilities plans. (Reference-Title 25, §71.61.d.2).
____	45	5. Any other legal documents. (Reference-Title 25, §71.61.d.2).
____	45	6. Dates or timeframes for items 1-5 above on the project's implementation schedule.
		D. Identify the proposed institutional alternative for implementing the chosen technical wastewater disposal alternative. Provide justification for choosing the specific institutional alternative considering administrative issues, organizational needs and enabling legal authority. (Reference-Title 25, §71.61.d.2).
		VIII. Justification for Selected Technical & Institutional Alternatives
		A. Identify the technical wastewater disposal alternative which best meets the wastewater treatment needs of each study area of the municipality. Justify the choice by providing documentation which shows that it is the best alternative based on:
____	46	1. Existing wastewater disposal needs. (Reference-Title 25, §71.21.a.6).
____	47	2. Future wastewater disposal needs. (five and ten years growth areas). (Reference-Title 25, §71.21.a.6).
____	47	3. Operation and maintenance considerations. (Reference-Title 25, §71.21.a.6).
____	48	4. Cost-effectiveness. (Reference-Title 25, §71.21.a.6).
____	48	5. Available management and administrative systems. (Reference-Title 25, §71.21.a.6).
____	48	6. Available financing methods. (Reference-Title 25, §71.21.a.6).
____	49	7. Environmental soundness and compliance with natural resource planning and preservation programs. (Reference-Title 25, §71.21.a.6).
____	49	B. Designate and describe the capital financing plan chosen to implement the selected alternative(s). Designate and describe the chosen back-up financing plan.

PENNVEST I.D. No. _____

ADDITIONAL REQUIREMENTS FOR PENNVEST PROJECTS

Municipalities that propose to implement their official sewage facilities plan updates with PENNVEST funds must meet six additional requirements to be eligible for such funds. See Appendix N for greater detail, contact the DEP regional office serving your county listed in Appendix J.

DEP Use Only	Indicate Page #(s) in Plan	Item Required
_____	_____	1. Environmental Impact Assessment. (Planning Phase) The Uniform Environment Review (UER) replaces the Environmental Impact Assessment that was a previous requirement for PENNVEST projects.
_____	_____	2. Cost Effectiveness (Planning Phase) The cost-effectiveness analysis should be a present-worth (or equivalent uniform annual) cost evaluation of the principle alternatives using the interest rate that is published annually by the Water Resources Council. Normally, for PENNVEST projects the applicant should select the most cost-effective alternative based upon the above analysis. Once the alternative has been selected the user fee estimates should be developed based upon interest rates and loan terms of the selected funding method.
_____		3. Second Opinion Project Review. (Design Phase)
_____		4. Minority Business Enterprise/Women's Business Enterprise (Construction Phase)
_____		5. Civil Rights. (Construction Phase)
_____		6. Initiation of Operation/Performance Certification. (Post-construction Phase)

EXECUTIVE SUMMARY

This Act 537 Plan/Special Study was prepared for the East Norriton-Plymouth-Whitpain Joint Sewer Authority (ENPWJSA) at the request of the Authority and the Pennsylvania Department of Environmental Protection (PA DEP) in accordance with Act 537 entitled the Pennsylvania Sewage Facilities Act, Title 25, Chapter 71 of the Pennsylvania Code and the Pennsylvania Department of Environmental Protection Act 537 Plan Content and Environmental Assessment Checklist. This Plan/Special Study addresses the planning requirement necessary to meet the wastewater conveyance and treatment needs of the ENPWJSA participating municipalities. These municipalities include Plymouth Township, Whitpain Township, and East Norriton Township.

The Plan is comprised of the following components addressed in the Plan of Study:

I. Previous Wastewater Planning
II. Physical and Demographic Analysis
III. Existing Sewage Facilities in the Planning Area
IV. Future Growth and Development
V. Alternatives to provide for new or improved wastewater disposal facilities
VI. Evaluation of Alternatives
VII. Institutional Evaluation
VIII. Selected Wastewater Treatment and Institutional Alternative

For this Plan, the planning area includes all of East Norriton Township, a portion of Plymouth Township, and a portion of Whitpain Township.

The treatment plant, located in Plymouth Township, Montgomery County, Pennsylvania, serves the three (3) townships referenced above. Each township submitted its projected flow requirements for average daily flow and three-month maximum daily average flow to ARRO. ARRO compiled this flow information and estimated the capital improvements needed to accommodate this flow, and the costs associated with them.

Capital improvements will be needed to accommodate the annual average flow of 8.67 MGD and 3-month maximum flows of 11.29 MGD. The selected approach to accommodate these flows is to:

a. Implement the recommendations of the Corrective Action Plan as approved by DEP. (the Plan is found in Appendix A).

b. Increase the capacity of the activated sludge portion of the wastewater treatment plant. The improvements necessary to allow for this increase are:

- Add one 60-foot diameter primary clarifier.
- Add one 680,000-gallon aeration tank in parallel to the existing units.
- Add one 70-foot diameter secondary clarifier.
- Add one 92,000-gallon chlorine contact tank.
- Upgrades/modifications to the return activated/waste activated sludge pumping systems.
- Additional yard piping and structures for wastewater distribution.

The capital cost to implement the expansion of the activated sludge portion of the plant is $5,625,000.

A preliminary schedule for implementing the Corrective Action Plan items as well as the proposed activated sludge process expansion is found on the graphic in Appendix B.

The selected alternative will be funded by each of the participating municipalities in accordance with the current intermunicipal agreement. The ENPWJSA will consider financing the proposed upgrades via a municipal bond issue. However, the ENPWJSA will review all financial options available to it. It should be noted that funding for the installation of a new aeration tank will be accomplished through the use of bond proceeds that the Authority currently has.

I. PREVIOUS WASTEWATER PLANNING

Refer to the documentation found in Appendix C of this Plan. A description of Previous Wastewater Planning, for each of the participating municipalities, has been inserted in this Appendix. The participating municipalities include:

A. East Norriton Township

B. Plymouth Township

C. Whitpain Township

Each of the municipalities have prepared their own 537 Plans and submitted this documentation under separate cover. The portions of these plans documenting Previous Wastewater Planning are included with the ENPWJSA 537 Plan.

II. PHYSICAL AND DEMOGRAPHIC ANALYSIS

Refer to the documentation found in Appendix C of this Plan. A description of the Physical and Demographic nature of each participating municipality has been inserted in this Appendix. The participating municipalities include:

A. East Norriton Township

B. Plymouth Township

C. Whitpain Township

Each of the municipalities have prepared their own 537 Plans and submitted this documentation under separate cover. The portions of these plans documenting Physical and Demographic Analysis are included with the ENPWJSA 537 Plan.

III. EXISTING FACILITIES IN THE PLANNING AREA

A. Describe Municipal Sewerage Systems in the Planning Area

1. Location, Size and Ownership of Treatment Facility

The ENPWSJA wastewater treatment plant (WWTP) is located in Plymouth Township, Montgomery County. The plant provides advanced secondary treatment for an average annual permitted flow of 8.1 MGD. Two trickling filtration process trains and an activated sludge process provide for treatment of the wastewater. The wastewater treatment plant discharges treated effluent to the adjacent Schuylkill River. In accordance with the current NPDES Permit (Permit No. PA 0026816), the plant is permitted to discharge 9.3 MGD monthly average and 8.1 MGD annual average. Monthly effluent NPDES limits include 20 mg/l $CBOD_5$ from May through October and 25 mg/l from November through April. The suspended solids average limit is 30 mg/l monthly. The annual average flow for 2004 was 6.45 MGD. The highest consecutive maximum three-month average for 2004 was 7.75 MGD.

Refer to the overall wastewater collection and conveyance system plan found in Appendix D, which identifies the location of the plant in relation to the rest of the collection and conveyance system.

2. Basic Treatment Process

Wastewater enters the treatment plant at the Raw Sewage Pump Station. Flow can be conveyed to one of two sets of primary clarifiers. One set of primary clarifiers serves the activated sludge process. The other set of primary clarifiers serve the trickling filter process train. From either the

activated sludge or trickling filter processes, flow is directed to the secondary clarifiers or secondary settling tanks respectively. Effluent from the clarifiers is conveyed to chlorine contact tanks for disinfection and discharged to the Schuylkill River.

Refer to the figures in Appendix E that provides schematic diagrams for the basic treatment process for both the liquid and solids.

3. Description of problems, if any, with the Authority's Facilities

The ENPWJSA is not projecting a hydraulic or organic overload condition at the WWTP. However, during significant rain events, both the wet well at the ENPWJSA's Sawmill Run Pump Station, the manhole immediately upstream within the East Norriton Township system and the manhole on Ross Road near the railroad overpass have experienced overflows. To address the high flows at the Sawmill Run Pump Station, within the Sawmill Run Interceptor and Forcemain, and at the WWTP, the ENPWJSA has developed a Corrective Action Plan. This Plan has been approved by PADEP and is found in Appendix A.

4. On-going Upgrading or Expansion of the Treatment Facilities

During 2004, improvements to the wastewater treatment plant's sludge handling, thickening and dewatering facilities include:

- Rebuilt a section of the upper hearth in the incinerator and replaced a cracked incinerator rabble arm.

- Modified the water feed piping for the potassium permanganate feed system to supply plant utility water to the system instead of potable

water. This modification has resulted in a savings of $500 to $1,000 per month in potable water costs.

- Replaced the main drive sprockets and overhauled the main belt drive shafts on the belt filter press.

- Rebuilt Sludge Feed Pump #2 for the sludge dewatering system.

- Both sludge thickeners were drained to remove accumulated rags and grit. Three (3) new plug valves were installed on the bottom sludge suction pipes for the sludge thickeners.

- Installed a new conveyor belt and replaced the lower drum shaft and bearings on the inclined conveyor for the sludge incineration system.

- Completely replaced the building heating system in the sludge dewatering building area.

Trickling Filters

During 2004, improvements to the Trickling Filters were:

- Rebuilt Trickling Filter Raw Sewage Pump #2.

- Installed electric soft starts for the two primary trickling filter feed pumps.

- New sampling pipes were installed for the chlorine residual analyzer.

- All new primary and secondary settling tanks were drained, cleaned, and inspected. In addition, all wear shoes on the sludge collector mechanism were flipped over to provide extended lift for these systems.

Activated Sludge Treatment Plant

During 2004, improvements to the Activated Sludge Treatment Plant were:

- Rebuilt Activated Sludge Raw Sewage Pump #3.

- Rebuilt Return Activated Sludge Pumps #1 and #2.

- Rebuilt Grinder #1 in the raw sewage pump station.

- Cleaned the air diffuser systems in both aeration tanks by removing years of accumulated rags and grit.

- Improvements to the chlorination system included replacement of the chlorine residual analyzer, replacement of the chlorine injector pipe for the chlorine contact tanks, and installation of new sampling pipes for the chlorine residual analyzer.

Currently, the ENPWJSA is implementing modifications to the existing aeration basins using a SymBio® process from Enviroquip, Inc., installation of new blowers with variable speed control, and a new fine-bubble diffused aeration system. The SymBio® process uses an innovative process for monitoring the activity of the biomass (sludge) and the dissolved Oxygen (DO) levels to precisely determine the biological oxygen demand. This allows aeration at very low DO levels for

simultaneous nitrification and denitrification within the same basin. The objective is to greatly optimize total nitrogen removal (to meet 10 mg/l effluent concentrations in summer months) thereby affording better quality effluent, as well as crating a significant reduction in energy costs.

Sewage Collection System

During 2004 an inflow/infiltration (I/I) study was performed on the 30-inch and 36-inch diameter interceptor sewers from the intersection of Plymouth Boulevard and Fornance Street to the intersection of Ridge Pike and Ross Street. The results of the study showed that there were no significant sources of I/I entering this section of the interceptor sewer.

Plant-Wide Systems and Miscellaneous Items

During 2004, the following plant-wide system and miscellaneous items were completed:

- Regenerated the carbon filter system for odor control for the sludge dewatering building.

- A new potable water main was installed in the lower section of Ross Street up to the water meter pit of the sewer authority.

- An engineering study was performed by an engineering consulting firm to identify future capital needs and to make recommendations for upgrading or replacing many of the older processes at the wastewater treatment facility.

- All gaseous chlorine piping was replaced in the plant chlorinator room. A new 2-pen chlorine residual chart recorder was installed to provide for more efficient monitoring and control of the chlorine residual in both the trickling filter and activated sludge plants.

All of the treatment plant and major tributary flow meters were calibrated during 2004.

5. Description of Operations and Maintenance Requirements for OLDS

Refer to the documentation provided by each of the participating municipalities. This is found in Appendix C of this Plan.

6. Ultimate Disposal Areas

Refer to the documentation provided by each of the participating municipalities. This is found in Appendix C of this Plan.

B. Location and Condition of OLDS

Refer to the documentation provided by each of the participating municipalities. This is found in Appendix C of this Plan.

C. Identification of Wastewater Sludge and Septage Generation

Refer to the documentation provided by each of the participating municipalities. This is found in Appendix C of this Plan.

IV. FUTURE GROWTH AND LAND DEVELOPMENT

In Appendix C of this Plan, each of the participating municipalities address the following:

A. Areas with existing development or plotted subdivisions.

B. Land use designations.

C. Future growth areas.

D. Zoning and subdivision regulations.

Given the information provided by each municipality, the needs in terms of wastewater flow were defined. Each submitted projected flow requirements for average daily flow and three-month maximum daily average flow. The results are presented in Table 1.

The current wastewater treatment plant combined facilities have a permitted annual average daily flow capacity of 8.1 MGD, and are permitted to discharge 9.3 MGD maximum monthly average flow. And, as Table 1 shows, the annual average flow anticipated is 8.67 MGD, and the 3-month maximum flow desired is 11.29 MGD.

Table 1
Municipal Flow Needs

Municipality	Projected Municipal Avg. Daily Flow(mgd)	Projected 3 Month Max. Flow (mgd)
Plymouth Township	3.60	4.49
East Norriton Township	2.70	3.30
Whitpain Township	2.37	3.50
Totals	**8.67**	**11.29**

Notes: 1. Projected municipal flow provided by each municipality Refer to Appendix C for the documention verifying these flow projections.

2. Whitpain Township and East Norriton Township provided 3 month maximum flows. Plymouth Township's 3 month maximum flows are based on their Average Annual Flow multiplied by the 3 mo. Maximum factor averaged over the past 6 years.

V. ALTERNATIVES TO PROVIDE NEW OR IMPROVED WASTEWATER DISPOSAL FACILITIES

A. Identify the Alternatives to Provide for Improved Sewage Facilities

1. Identification of Regional Wastewater Treatment Concepts

The East Norriton-Plymouth-Whitpain Joint Sewer Authority (Authority) is a municipal authority with members that represent the participation of East Norriton Township, Plymouth Township, and Whitpain Township in making the decisions necessary to provide wastewater collection and treatment to the residents of these municipalities. The authority was formed by East Norriton Township and Plymouth Township in 1959. The Authority's first course of action was to issue sewer treatment revenue bonds in order to finance the construction of a wastewater treatment plant to serve both townships. The facility was constructed on the bank of the Schuylkill River at the end of Ross Street in Plymouth Township. At a later time, Whitpain Township was permitted, under a contractual agreement, to discharge wastewater to the treatment plant. Over time, Whitpain Township became a voting member of the Authority. The Authority and its staff own, operate, and maintain the wastewater treatment plant.

It is the intention of the Authority to continue to provide wastewater treatment for its member municipalities at this regional facility.

2. Extension of Sewage Facilities to Needs Areas

Needs areas, as identified in the individual municipal plans, will receive public sewer service as determined by the individual municipalities. Refer to the Plan text prepared by each municipality found in Appendix C.

3. Potential for Continued Use of the Existing Treatment Facility Through Upgrading of the Facility

a. Facility Description

The Authority's sewage treatment plant consists of three distinct wastewater treatment trains of two process types, trickling filter biological treatment and activated sludge biological treatment, connected through various wet well and pumping systems.

As is typical to many wastewater treatment plants, expansion has occurred over the years by the addition of new facilities capable of functioning separately. In 1961, the original West Trickling Filter Plant was brought on line. As flows increased, the East Trickling Filter Plant was added in 1969. Both trickling filter plants consist of primary settling, primary and secondary trickling filters, and secondary settling. Each trickling filter system is rated at 2.2 million gallons per day (MGD). In 1978, the activated sludge facility was constructed to handle the increased flows from the municipalities.

The current wastewater treatment plant combined facilities have a permitted annual average daily flow capacity of 8.1 MGD, with a maximum 3-month average flow of 9.3 MGD. The treatment plant discharges through an outfall into the Schuylkill River under National Pollution Discharge Elimination System (NPDES) Permit No.

PA0026816. Table 2 shows the current average monthly allowable effluent limits.

Influent flow metering is performed in two locations within the plant. One Parshall flume meters the combined wastewater flow from East Norriton Township and Whitpain Township and a portion of Plymouth Township. The second Parshall flume meters the wastewater flow from Plymouth Township. The flow rates are recorded in the Pump/Control Building control room.

Table 2

ENPWJSA EFFLUENT LIMITS

Discharge Parameter	Avg. Monthly Concentrations (mg/l)
$CBOD_5$ (5-1 to 10-31)	20
$CBOD_5$ (11-1 to 4-30)	25
Total suspended solids	30
Ammonia as N	20
Fecal coliform	200 organisms/100 ml
Dissolved oxygen	5.0 mg/l minimum
pH	6 pH units minimum, 9 maximum
Total residual chlorine	0.5

A Pump/Control Building was constructed to distribute flow to the three wastewater treatment facilities. Flow to the East and West trickling filter plants occurs by pump or by gravity when the flow in the plant's main wet well exceeds a given elevation. Flow to the Activated Sludge plant is pumped from three pumps in the main plant influent wet well to two primary circular clarifiers. After primary clarification the wastewater flows by gravity to two parallel aeration

basins. Effluent from the aeration basins flows by gravity to two secondary circular clarifiers.

During normal operations all three facilities work in parallel to one another. All three facilities conclude treatment with disinfection using chlorination prior to discharge to the Schuylkill River.

Sludge handling consists of thickening, dewatering with belt filter presses, and incineration by multiple-hearth incinerator.

a.) Preliminary Treatment

The Pump/Control Building wet well receives all wastewater flow from the collection system. The flow passes through two 10.0 MGD hydraulic powered influent grinders before passing into the wetwell. A bypass screen with openings of approximately 2-inches is available when it is desired to bypass the influent grinders. This screen requires manual cleaning.

b.) Biological Treatment (East & West Trickling Filter Systems)

There are two identical Trickling Filter biological treatment systems at the plant. Each system consists of primary and secondary settling tanks and primary and secondary trickling filters, and adjacent chlorine contact tanks.

Each primary settling tank consists of four rectangular tanks, each with a surface area of 1,470 square feet and an effective volume of 115,500 gallons. Sludge in each tank is collected by chains and flights and withdrawn by computer controlled motor operated plug valves. Primary settling tank effluent flows into a dedicated Recirculation Pump Station wetwell.

Each Recirculation Pump Station has a split wetwell. Half of the wetwell receives flow from the primary settling tank. Excess water in the primary wetwell flows over a weir into the other half of the wetwell where it is pumped to the secondary trickling filter. Three Chicago vertical drive centrifugal pumps are housed in each Recirculation Pump Station. One pump sends flow to the 98-foot diameter primary trickling filter. The second pump sends flow to the 98-foot diameter secondary trickling filter. The third pump is a backup and can be valved to send flow to either trickling filter.

Butterfly valves were once in place that were used to adjust recirculation around the trickling filters to enhance treatment. They were removed years ago. Recently, new butterfly valves and flow meters were installed. Recirculation flow from each primary trickling filter flows by gravity through these valves and meters to the trickling filter raw sewage pump station.

Each secondary settling tank consists of four rectangular tanks with a surface area of 1,470 square feet and an effective volume of 115,500 gallons. Sludge in each tank is collected by chains and flights and withdrawn by motor operated telescoping valve.

c.) Biological Treatment (Activated Sludge System)

Raw wastewater is pumped from the Pump/Control Building wetwell to the primary settling tank inlet division chamber. The division chamber splits the flow to two 60 ft. diameter primary settling tanks.

Each primary settling tank is sized for a surface-settling rate of 655 gallons per day per square foot and has an effective volume of 380,700 gallons. The surface-settling rate is well below the state criteria of 1,000 gallons per day per square foot at maximum monthly flow. Two 5-horsepower pumps pump primary clarifier sludge to the sludge thickening tanks.

Wastewater flow from the primary settling tanks proceeds by gravity to the two aeration tanks. Each 24-foot by 181-foot aeration tank has an effective volume of 685,000 gallons. The wastewater is mechanically mixed with return activated sludge pumped from the secondary settling tanks before entering the aeration tanks. The wastewater is aerated through 120 coarse bubble static aeration tubes in each tank by one (1) or two (2) of three (3) 250-hp Lamson blowers rated at 4,000 cfm each. The aeration tanks are equipped with gates along the sides that allow for a step-feed mode of operation.

The aerated biological floc flows by gravity to the secondary clarifier inlet division chamber. The secondary settling tank inlet division chamber splits the flow to two 70 ft. diameter secondary settling tank. Each secondary settling tank is sized for a surface settling rate of 480 gallons per day per square foot and has an effective volume of 349,400 gallons. The secondary clarifiers provide gravity settling of the biological floc generated in the aeration tank. Most of the settled floc is pumped back to the aeration tanks to treat incoming wastewater through the use of three 10-horsepower return activated sludge pumps. Two pumps operate continuously while one remains in standby mode. A computer controlled waste activated sludge motorized plug valve is

used to waste a portion of the settled floc to the sludge thickener tanks.

d.) Chlorine Contact Tanks

Disinfection is achieved by adding chlorine and providing contact time in the chlorine contact tanks. The Trickling Filter System and the Activated Sludge System have dedicated chlorine contact tanks.

The Trickling Filter System has two chlorine contact tanks, each with an effective volume of 93,700 gallons. The Activated Sludge System has two chlorine contact tanks, each with an effective volume of 92,100 gallons. Contact time in these tanks is greater than the State-required 30 minutes and adequate for maximum monthly flow. Effluent leaving the chlorine contact tanks is combined and discharged by gravity flow through a 30-inch outfall pipe into the Schuylkill River.

e.) Chemical Feed Systems

There are three (3) chemical feed systems at the facility: Potassium Permanganate, Polymer, and Chlorine.

An odor control potassium permanganate system is in place to deliver 290 lb/day to the thickened sludge prior to its application on the belt filter press. Potassium permanganate is also fed into the trickling filter secondary sludge/truck pit wetwell for sludge odor control in the sludge thickeners.

A polymer system is in place to inject polymer into the sludge line from the sludge feed pumps prior to its application on the belt filter

press. The polymer dosage is about 15 lbs. per ton of sludge solids, which is normal.

The third chemical feed is for chlorine, which is used for disinfection of the effluent prior to discharge. Chlorine gas is fed by vacuum into a chlorine eductor system into the plant effluent from 1-ton cylinders located in the Incinerator Building.

f.) Sludge Processing

In 1978 the two original trickling filter plant digesters were repiped and converted to sludge thickeners. Sludge removed from the system as well as sludge brought into the plant by tank sludge haulers for incineration is discharged into the sludge thickeners. Solids retention time within the tanks varies due to the varying amounts of sludge brought into the plant, therefore solids concentration of the sludge prior to pumping the sludge onto the belt filter press will vary.

The plant utilizes a 2.2-meter belt filter press. The belt filter press equipment operator regulates the amount of sludge pumped from the thickener to the belt filter press conditioning tank. Potassium permanganate and polymer are injected into the sludge prior to application on the press belt. The press is operated approximately 5 days each week.

Pressed sludge cake of approximately 20 percent solids and scum are transported to a multiple hearth incinerator by an inclined belt conveyor. The incinerator uses natural gas to evaporate remaining water from the dewatered sludge so that it will combust.

g.) Projected Flows

Plymouth Township, Whitpain Township, and East Norriton Township each submitted projected flow requirements for average daily flow and three-month maximum daily average flow. Refer to Table 1 in Section IV.

The current wastewater treatment plant combined facilities have a permitted annual average daily flow capacity of 8.1 MGD, and are permitted to discharge 9.3 MGD maximum monthly average flow. And, as referenced above, shows the annual average flow anticipated is 8.67 MGD, and the 3-month maximum average flow desired is 11.29 MGD.

h.) Provision to Treat Annual Average Flow of 8.67 MGD

A previous study (preliminary plant re-rating report), dated September 2002, proposed rerating the current activated sludge plant to treat 5.44 MGD annual average flow. A copy of the report is presented in Appendix F. Upon review of this report by the Authority, it was determined that some of the data utilized in the report was not correct. However, the conclusions established in the re-rating report were found to be generally acceptable.

The report indicates that the existing clarifiers are satisfactory to treat the proposed rerated flow of 5.44 MGD. And, the aeration capacity of the existing blowers is more than adequate. Furthermore, ability to treat this amount of flow has been demonstrated. For instance, in June and early July of 2002, one train of treatment adequately treated 3.0 MGD, equivalent to 6.0 MGD capacity with both trains running.

Rerating the treatment capacity of the activated sludge process to 5.44 MGD would increase the total plant capacity to 9.4 MGD. Therefore, if a rerating were approved by the Pennsylvania Department of Environmental Protection (PA DEP), it should take care of the immediate needs for average daily flow.

A possible problem with PA DEP approval of rerating the activated sludge process would be the ability to meet the 20-mg/l ammonia-nitrogen limit. PA DEP may question the adequacy of the existing processes to meet that limit in the winter months. If this is the case, then replacement of the stone media with plastic media in the trickling filters would not ensure nitrification is achieved through the flow treated by the trickling filters. The trickling filters would need to be replaced with trickling filter towers to ensure that nitrification would be achieved.

A preliminary design report for replacing the media in the West Trickling Filters with plastic media was prepared. A copy of this report is presented in Appendix G. The estimated cost in today's dollars to upgrade the trickling filters to achieve nitrification is about $700,000. It is assumed the cost of replacing the media in the other trickling filters is also $700,000, making the total cost $1,400,000. If 4.4 MGD of the total 8.67 MGD were nitrified as expected with this upgrade, this would ensure compliance with the 20-mg/l ammonia-nitrogen limit.

It should be noted that the stone media and underdrains date back to the 1960's, and they have exceeded their expected useful life. Replacement of the stone media with plastic media is often

performed as a normal capital replacement and improvement project under these circumstances.

i.) Provision to Treat 3-Month Maximum Average Flow of 11.29 MGD

In order to meet the desired growth and expected capacities within the three townships, the plant must be able to treat a 3-month maximum average flow of 11.29 MGD. The current treatment facilities are permitted to treat up to 9.3 MGD for 3-month maximum average flow. Even if a rerating were approved for the activated sludge process, the capacity would not be increased enough to handle this amount of flow, and capital improvements are needed.

To meet the flow established by the municipal needs, it is recommended that the activated sludge process be expanded. It is not feasible to upgrade the hydraulic capacity of the trickling filter plant as the hydraulic capacity is limited by clarifier surface area, and there is no space for additional final clarifiers. Based on this, an additional 2.09 MGD is needed for the activated sludge plant.

Studies prepared by ARRO Consulting, Inc. and RK&K, LLP (excerpts found in Appendix H) both recommend the expansion of the activated sludge process to handle projected wastewater flows. However, each study presented a slightly different means to achieve the proposed expansion.

Alternative 1:

1. Add one 60-foot diameter primary clarifier;
2. Add one 680,000 gallon aeration tank in parallel to the existing units;
3. Add one 70-foot diameter secondary clarifier;
4. Add one 92,000-gallon chlorine contact tank.
5. Return Activated and Waste Activated Sludge Pumping System Upgrades.
6. Upgrades to Piping and Structures for distribution of wastewater.

Alternative 2:

1. Do not add a primary clarifier;
2. Add one 680,000-gallon aeration tank in parallel to the existing units;
3. Add one 110-foot diameter secondary clarifier;
4. Add one 92,000-gallon chlorine contact tank.
5. Return Activated and Waste Activated Pumping System Upgrades.
6. Upgrades to Piping and Structures for distribution of wastewater.

Upon reviewing both options, there is a concern that Alternative 2 will have a negative impact on facility operation. There is no provision for an additional primary clarifier with the second alternative. Primary clarifiers provide a means for the initial reduction of influent BOD. Without this reduction for the additional flows, the operations staff may find it more difficult to nitrify and denitrify in the activated sludge process. Additionally, there may be the risk that more solids will settle in the secondary clarifiers creating a build-up in the sludge blanket and requiring additional maintenance concerns for the secondary clarifiers. However, the Authority has indicated that their influent BOD levels have been historically

low. But hydraulically, the addition of another primary clarifier could act as a buffer in terms of allowing the Authority to manage increased influent flows.

Given that the current treatment process employs primary and secondary clarification, it is recommended that an expansion be implemented that is consistent with the current treatment scheme. This will assist the plant staff from an operations and maintenance perspective.

In addition to the expansion of the activated sludge process, the Corrective Action Plan (found in Appendix A) identifies the following Capital Improvements that will be needed to meet existing and future needs.

Capital Improvements Necessary to Meet the Corrective Action Plan goals:

1. Sawmill Run Interceptor Junction Box 1
2. Auxiliary Pumping Facilities
3. Activated Sludge Raw Sewage Pumps
4. Sawmill Run Pump Station – Pump Conversion
5. Sawmill Run Forcemain Extension
6. Ross Street Interceptor Improvements
7. Sawmill Run Interceptor Junction Box 2

Capital Improvements Not Necessary to Meet the Corrective Action Plan goals, but needed to serve the ENPWJSA future needs:

1. Activated Sludge Tanks/Fine Bubble Diffusers (SymBio Process) on-going
2. Electrical System Rehabilitation
   a. MCC at WWTP
   b. Transformers at WWTP
   c. MCC at Sawmill Run Pump Station
   d. Substation Switchgear at Sawmill Run Pump Station

3. Headworks Upgrades at the WWTP
4. Disinfection System Replacement
5. Additional Belt Filter Press at the WWTP

4. Need for New Community Sewage Systems

Needs for new community sewerage in the individual municipalities, if any, are defined in the municipal Plans. Refer to the Plans prepared by each municipality found in Appendix C.

5. Repair and Replacement of Collection and Conveyance System Components.

The ENPWJSA owns, operates and maintains the Sawmill Run Pumping Station (Sawmill) that serves customers within East Norriton, Plymouth, and Whitpain Townships. The Authority also owns, operates and maintains force mains and interceptors that originate at Sawmill and end at the WWTF. Sawmill is equipped with three (3) constant speed pumps rated at 2.44 MGD each and three (3) variable speed pumps rated at 7.57 MGD each. The control scheme for Sawmill is currently designed and configured such that a maximum of two (2) constant speed and two (2) variable speed pumps can be operated at one time. When all four (4) pumps are operating, the total calculated capacity of Sawmill is 17.2 MGD. The ENPWJSA has completed the installation of a Supervisory Control and Data Acquisition System (SCADA) that will provide detailed operational data with regard to Sawmill Run Pump Station and the WWTF. This tool is critical to the success of preventing future overflows by illustrating flows, wet well and tank levels during significant rain events that currently must be estimated. It will also generate a more

expedient response by ENPWJSA personnel to critical high water conditions.

Both the wet well at Sawmill and the manhole immediately upstream within the East Norriton Township sewerage system have experienced overflows during significant rain events. This became evident during calendar years of 2003 and 2004, two of the wettest years on record. ENPWJSA personnel have reported overflows at both locations to PADEP. Generally, the noted manhole will be the first to overflow. There are no documented overflows of Whitpain or Plymouth Township's sewerage in the vicinity of Sawmill. It appears as though there are hydraulic restrictions at Sawmill that may impede the ability of flow from East Norriton Township to enter the wet well as readily as flow from the other two (2) Townships.

Two (2) 24-inch diameter force mains extend from Sawmill to the gravity interceptors. One (1) force main services the three (3) constant speed pumps at Sawmill; the other the three (3) variable speed pumps. The force mains are cross-connected and valved at the station to allow flow from either group of pumps to either force main. The force main from the variable speed pumps discharges to a newer 30-inch gravity interceptor while the force main from the constant speed pumps discharges to an older 18-inch gravity interceptor before discharging into the same 30-inch gravity interceptor sewer (at the intersection of Fornance Street and Sandy Hill Road) as the variable speed pumps. The 30-inch gravity interceptor extends from the intersection of Plymouth Boulevard and Fornance Street to the intersection of Fairfield Avenue and Jefferson Street. From this point, the diameter of the interceptor increases to 36 inches until the intersection of Ridge Pike and Ross Street. The interceptor then discharges to a junction box, which splits into two (2) 24-inch parallel

gravity interceptors that extend the length of Ross Street to the head of the WWTF. Due to the configuration of the junction box, flow between the two (2) 24-inch interceptors is not equalized. This has resulted in one of the two (2) parallel 24-inch gravity interceptors overflowing during significant rain events. In 2003, the Authority employed a contractor to install an equalization pipe between two (2) manholes along the Ross Street parallel sewers. This resulted in a more "evening" of the flow and has reduced the number of overflow events but due to the hydraulic configuration, has not eliminated them. A diagram of the conveyance system of the Pump Station and Force Main is included with the Corrective Action Plan found in Appendix A.

The Corrective Action Plan details the necessary actions to be taken to ensure proper operation of the ENPWJSA's conveyance system. In addition, the implementation of the Corrective Action Plan will enable the ENPWJSA to meet the projected municipal needs as detailed in Section IV of this Plan.

6. Alternative methods of collection and conveyance to serve needs areas

For the service area/planning area delineated for this Plan, there are no alternative methods of collection and conveyance to serve municipal needs areas.

B. Use of Individual Disposal Systems

The use of or implementation of individual disposal systems beyond those that are already in use is not considered an alternative for this Plan. Refer to the individual municipal plans for further information.

C. Small Flow Sewage Treatment Facilities, Land Treatment, Alternatives or Package Facilities

The implementation of small flow sewage treatment facilities, land treatment, alternatives, and package facilities are not applicable to this Plan. Refer to the individual municipal plans for further information.

D. Community Land Disposal Alternatives

Community land disposal alternatives are not considered as an alternative for this Plan. Refer to the individual municipal plans for further discussions of community land disposal alternatives.

E. Retaining Tanks

There is no plan to implement retaining tanks as part of this Plan. Refer to the individual municipal Plans for information concerning the potential use of retaining tanks.

F. Sewage Management Programs

Sewage Management Programs are implemented by each of the participating municipalities. Refer to the individual municipal plans for additional information. The Authority accepts and receives septage at the wastewater treatment plant.

G. Non-Structural Comprehensive Planning Alternatives

It is not the objective of the municipalities to make changes to their comprehensive plans at this time.

H. No-Action Alternatives

A no-action alternative for this Plan would mean that there would be no implementation of any of the alternatives referenced in this Section. No collection, conveyance or treatment system modifications would be made and the Authority would be limited to maintaining their exiting facilities and treating increasing influent flows.

1. Water Quality and Public Health

From a water quality and public health standpoint, "no-action" would be an impact since the current wastewater treatment plant would not be able to manage or treat average daily flow at the projected growth conditions. This would influence the Authority's ability to meet NPDES permit requirements and would lead to restrictions being placed on growth, to keep the current system within its design capacity.

2. Growth Potential

"No-action" would require the Authority and member municipalities to restrict connections to the collection system thus limiting the projected growth in the Authority's service area.

3. Community and Economic Conditions

Restricting connections due to lack of system improvements would restrict community and economic development in the long term because continued development would not occur and industries would be unable to expand. Important commerce planned for the region and other commercial projects in the region would be affected.

4. *Recreational Opportunities*

Recreational opportunities would be impacted by "no-action" to improve or expand the collection, conveyance or treatment system.

5. *Drinking Water Sources*

"No-action" would have an impact on drinking water sources that utilize the Schuylkill River as a surface water source downstream from the WWTP. This impact would be realized when the current wastewater facility would not be able to fully treat the projected sewage flows and remain within the discharge limits set forth in the NPDES permit.

6. *Other Environmental Concerns*

Without implementing potential alternatives to the collection/conveyance system, as well as the wastewater treatment plant, continued growth and expansion, in the WWTP's service area, will overload the existing system, increasing the potential for sewage overflows or "backup."

VI. THE EVALUATION OF ALTERNATIVES

A. Consistency Determination for Technically Feasible Alternatives

Title 25, Chapter 71.21(a)(5) of the Pennsylvania Code requires that each alternative proposed to provide for new or improved sewage facilities for each area of need be evaluated for consistency with the objectives and policies of:

- Comprehensive Plans;
- State Water Plans;
- Plans developed under Chapter 94;
- Plans developed under the Water Quality Act;
- Antidegradation Requirements;
- Pennsylvania's prime agricultural land policy;
- Plans adopted by the County and approved by the Department (PADEP) under the Storm Water Management Act;
- Wetland protection;
- Protection of rare, endangered, or threatened plant and animal species as identified by the Pennsylvania Natural Diversity Inventory; and
- The Historical and Museum Commission.

The viable alternative identified to serve the sewage planning needs of East Norriton Township, Plymouth Township, and Whitpain Township, involves treatment facility upgrades and possible collection/conveyance capacity modifications. The consistency determination is as follows for these alternatives:

1. Clean Streams Law

Planned improvements to the WWTP do not conflict with the objectives of the Clean Streams Law.

2. Chapter 94 Report

A review of the Authority's 2004 Chapter 94 Wasteload Management Report indicates no anticipated hydraulic overloads or organic overloads.

3. Federal Water Quality Act

The Federal Water Quality Act of 1987 establishes specific planning requirements for wastewater facilities planning. These requirements apply only to municipalities intending to apply for financial assistance from the Federal government for the construction of sewerage facilities. Consideration of applications for financial assistance from these municipalities depends on compliance with these planning requirements, several of which are beyond the scope of the plan content requirements for sewage facilities planning under Act 537.

A significant provision of the Federal Water Quality Act of 1987 provides for the capitalization of state revolving fund programs in the states. In Pennsylvania, this fund is a separate component of the PennVest program. Communities that propose to implement their official sewage plan updates with these funds must meet several specific planning requirements in order to be eligible to receive funding. While many of these requirements may be met through the normal plan content of the Act 537 planning process, several are outside the scope of Act 537.

4. Comprehensive Planning

The Montgomery County Planning Commission (MCPC) Comprehensive Plan, titled "Vision Plan", was adopted in 2001. Within the Comprehensive Plan, there is a list of "Vision Plan" goals. Goal #24 provides for "Focus on Public Sewer and Water Improvements in Designated Growth Areas." Within this goal, the Comprehensive Plan states that this goal can be achieved through:

- Updating and amending sewage facilities plans.
- Making sewage plans consistent with regional, county, and municipal comprehensive plans, zoning ordinances, and open space plans.
- Encouraging better cooperation between all the varying agencies and groups involved in sewer and water planning, including local authorities, municipalities, the county health and planning departments, and the State of Environmental Protection.
- Creating consistent implementation of the same goals for all groups involved in sewer and water planning.
- Zoning designated growth areas at densities that will support public sewers and water.
- Optimizing the efficiency of existing sewage treatment facilities.

With this being the case, there is no conflict with the strategies set forth by the Township's comprehensive plan.

5. Antidegradation Requirements

Effluent quality limits are set by the PADEP. Under the proposed technical alternatives as presented in this Plan, the preliminary effluent requirements for an average annual flow of 8.82 MGD are contained in Section V.A.3. of this Plan.

6. State Water Plans

No known conflicts with State water plans are anticipated due to expansion or new construction.

7. Prime Agricultural Policy

The alternatives presented for expansion of the existing wastewater treatment facility or the possible upgrade of existing collection and conveyance system components will not have an impact on prime agricultural land.

8. County Stormwater Management

Montgomery County is currently preparing a Model Stormwater Management Ordinance. It is anticipated that it will be released sometime during the fall of 2005. Since the Ordinance is not yet final, no conflicts were assessed with respect to this document.

9. Wetlands

A review of potential conflicts with wetlands was completed. Existing wetlands, shown on the National Wetlands Inventory Map in Appendix I, are not extensive aside from the existing creeks and streams. Upgrades to the wastewater treatment facility are expected to be contained within the existing plant site and not encroach upon any wetlands.

10. Protection of Plant and Animal Species of Concern

A Pennsylvania Natural Diversity Inventory (PNDI) review was initiated. PNDI review staff has responded to the review request. A review of the PNDI records

indicates that there may be occurrences of species of special concern. However, the PA Fish and Boat Commission has agreed to defer the assessment of these species until the preliminary design is complete. See Appendix J.

11. Pennsylvania Historical and Museum Commission (PHMC)

PHMC regulations state that if a project is being funded by either State or Federal funds and/or required a PADEP permit, a Bureau of Historic Preservation Site Assessment form must be completed.

A PHMC search was initiated for this project. A PHMC review has been completed. PHMC indicated that there are no National Register eligible or listed historic or archaeological properties in the area of the proposed project. Refer to PHMC response found in Appendix K.

B. Resolutions of Inconsistencies

Upon review of the "consistency determination" broached in this section, it has been determined that there are no inconsistencies relative to the proposed treatment alternatives.

C. Alternative Evaluation with Respect to Water Quality Standards and Effluent Limitations.

The planned alternatives to upgrade the wastewater treatment facility to meet the future hydraulic loadings will meet or exceed the NPDES requirements set forth in Section V.A.3. of this Plan.

D. Cost Opinion

A conceptual level opinion of probable cost has been prepared for the alternatives to expand the activated sludge portion of the WWTP as well as for costs associated with those improvements identified in the Corrective Action Plan.

Cost Opinion for Alternative 1: (with primary clarifier) - $5,625,000

Cost Opinion for Alternative 2: (without primary clarifier) - $5,100,000

Cost Opinions for Capital Improvements Necessary to Meet the Corrective Action Plan goals:

- Sawmill Run Interceptor Junction Box $20,000
- Auxiliary Pumping Facilities $75,000
- Activated Sludge Raw Sewage Pumps $300,000
- Sawmill Run Pump Station – Pump Conversion $900,000
- Sawmill Run Force Main Extension $350,000
- Ross Street Interceptor Improvements $2,850,000
- Sawmill Run Interceptor Junction Box 2 $125,000

Capital Improvements Not Necessary to Meet the Corrective Action Plan goals, but needed to serve the ENPWJSA future needs:

- Activated Sludge Tanks/Fine Bubble Diffusers
  SymBio Process (on-going) $1,100,000
- Electrical System Rehabilitation
  i. MCC at WWTP $850,000
  ii. Transformers at WWTP $80,000
  iii. MCC at Sawmill Run Pump Station $190,000
  iv. Substation Switchgear at Sawmill Run Pump Station $150,000

- Headworks Upgrades at the WWTP $2,650,000
  Disinfection System Replacement $1,375,000
- Additional Belt Filter Press at the WWTP $625,000

Miscellaneous costs for work to be completed at the Sawmill Run Pump Station could equate to approximately $150,000. Similarly, miscellaneous costs associated with work to be completed at the WWTP could equate to approximately $250,000.

E. Financing Alternatives

This section of the plan addresses financing alternatives that could be applicable for expansion and upgrade of the wastewater collection/conveyance system and the wastewater treatment plant. Three financing alternatives exist: municipal bond financing, bank loans, and direct capital funding. The selected financing alternative is addressed in Section VIII.B.

1. Municipal Bond Issue

a. General

There are several types of bonds, both taxable and tax-exempt. However, the general classification of municipal bonds usually refers to tax-exempt bonds. There are three types of municipal bonds generally used in financing public works.

- General Obligation Bonds are tax-free bonds that are secured by the pledge of the full faith, credit, and taxing power of the issuing agency. This means that this type of bond is backed by all of the taxes on real estates and personal property within the jurisdiction of the issuing

agency. It involves minimum risk to the investor and therefore requires a lower rate of interest than other types of bonds.

- Dedicated Tax Bonds are payable only from the proceeds from a special tax and are not guaranteed by the full faith, credit, and taxing power of the issuing agency. Examples of special dedicated taxes are the special assessments against property which is adjacent to and the principal beneficiary of the improvement, and gasoline taxes used to finance highway construction.

- Revenue Bonds are payable from revenues derived from the use of the improvement such as tolls, sewer bills, or rents paid by the users of the improvement and do not otherwise represent an obligation of the issuing agency. Revenue bonds are not ordinarily subject to statutory or constitutional debt limitations. They are often issued by commissions, authorities, and other public agencies created for the specific purpose of financing, constructing, and operating essential public projects.

Typically, municipal bonds are sold to an investment-banking firm which then resells the bonds to individual investors. The advantage of municipal bonds to the investor is their tax-free status. A bond discount (a percentage of the total bond issue) serves as the investment banker's commission. Before bonds are sold, they must be rated on the basis of risk to the investor by a rating agency such as Standard and Poor's or Moody's. The higher the rating, the lower the risk to the investor and, consequently, the lower the interest rate paid on the bond.

The legal instrument that sets forth the rules to be observed by the issuing agency is the Trust Indenture. The Trust Indenture is prepared by the Bond Counsel and must be printed along with the bonds. Due to specific requirements as to the

denominations of the bonds and methods and materials for printing, printing costs can be substantial. A Trustee is required to administer the bond issue and insure the terms of the Trust Indenture are observed. This results in an Annual Trustee fee.

The longer the term, the lower the annual debt service (repayment) and the higher the total amount of interest that must be paid. Investment bankers indicate that it does not pay to extend the terms beyond 25 years because the interest rate increases dramatically.

A trend in financing has been towards the use of a capitalized debt service reserve fund. This fund is capitalized at the beginning of the project by using the capital recovery factor for the interest rate and loan period associated with the project. A "cover" may also be used for this program. The cover, a percentage that is added to the annual debt service, is usually capitalized with the bond issue. The cover percentage could range from 0 to 20 percent.

b. Advantages of Municipal Bond Issue Funding

- This program affords long-term fixed rate financing.
- Tax-exempt municipal bonds are in high demand.
- There is local investment opportunity.
- Third party review is by PADEP, but its approval is not influenced by the dual role PADEP has with regard to PennVest of issuing a permit to construct and of approving the program for financing.
- Municipal Credit is established.
- It retains flexibility for future borrowing.
- Financing approval period is shorter than with PennVest.

c. Disadvantages of Municipal Bond Issue Funding

- Market interest rates are usually higher than maximum PennVest interest rates.
- A cover may be required.
- A Debt Service Reserve Fund is generally required.
- There are trustee fees and costs of preparing a Trust Indenture.
- Issuance costs are higher than with PennVest program.

2. Bank Loans

There are four basic categories of bank loans. These are:

- Real Estate Loans (Mortgage)
- Participations and Interbank Loans
- Installment Loans (Personal)
- Commercial and Industrial Loans

Of the four types, a commercial and industrial loan would be the most applicable to this project.

Commercial and industrial loans may be made on a demand or time basis. A demand basis loan allows the bank to call for repayment at any time, or the borrower can repay when convenient. A time basis loan provides for a specific loan maturity date.

Most commercial and industrial loans are unsecured. The credit is extended on the basis of an analysis of all available information pertaining to the customer and the bank's confidence in that customer's ability and willingness to repay.

For a wastewater treatment plant expansion, it appears that it would be prudent to seek a time basis loan. An interest rate offering would be established, and an amortization schedule set. Interest rates may range from 5% to 10%.

Advantages of the Bank Loan Financing

- Ability to shop around for a loan structure that best fits the customer's needs.
- Flexibility in establishing repayment schedules.
- Working with and through a local financial institution.
- Municipal credit is established.
- Ability to obtain fixed rate financing.

Disadvantages of Bank Loan Financing

- Interest rates are charged for loan repayment.
- Processing fees may be required.
- Processing and issuance fees may be expensive.

3. Direct Capital Funding

Another financing option for the implementation of the chose alternatives is direct funding by the participating municipalities. This would involve capital expenditures by the participating municipalities from its on capital funds.

Advantages of Direct Financing

- Avoid third party involvement. Payment for services can be made directly to the manufacturer or contractor.

- There is no interest charged to your expenditures.

- Bank processing and issuance fees are avoided.

Disadvantages of Direct Financing

- Reduces the amount of construction capital in the annual budget, thus reducing the ability to fund other construction projects during the fiscal year.

F. Need for Immediate or Phased Implementation

Phased construction of the proposed alternative will be predicated upon fiscal and intermunicipal issues. It appears, at this time, however, that phased implementation will not be necessary.

G. Ability of the Authority to Implement the Alternative

Currently, the Authority has an intermunicipal agreement in place. This agreement is with East Norriton Township, Plymouth Township, and Whitpain Township.

For reference, the current agreement is found in Appendix L.

VII. INSTITUTIONAL EVALUATION

A. Analysis of Borough; Past Actions and Present Performance.

1. Financial and Debt Status.

The Authority is well established and can implement the selected planning alternative. The Operating Budget for the year ending December 31, 2004 is summarized as follows:

Estimated Revenues	$3,483,471
Estimated Expenses	$3,141,602
Estimated Operating Income	$341,869
Debt Service	$310,790
Surplus	$31,079
Coverage	$10%

2. Available Staff and Administrative Resources.

The Authority has the staff and the administrative resources in place to implement the chosen alternative.

3. Existing Legal Authority.

The Authority has the legal capability to implement wastewater planning activities and recommendations for the treatment plant as well as operations and maintenance activities for the plant and their collection/conveyance system. East Norriton Township, Plymouth Township, and Whitpain Township have the right to discharge sewage, of a volume within the capacities reserved, to existing sewers

for conveyance to the Authority's wastewater treatment plant.

B. Institutional Alternatives Necessary to Implement the Technical Alternatives.

1. Need for New Municipal Department or Authorities.

The Authority is well established. There is no need for a new municipal department or Authority.

2. Municipal Functions.

The Authority owns, operates, and maintains the wastewater treatment plant. The Authority also owns, operates and maintains the Sawmill Run Pump Station and the Sawmill Run Interceptor. Each of the participating municipalities has the right to discharge to the Authority's facilities a volume within their respective reserve capacities.

3. Cost of Administration, Implementability, and the Capability of the Authority to React to Future Needs.

The Authority has the financial and staffing resources in place to react to future needs.

C. Administrative and Legal Activities to be completed.

1. Incorporation of Authorities or Agencies

There is no need to incorporate any additional authorities or agencies since these entities are already in place.

2. Ordinance, Regulations, and Intermunicipal

The Authority currently has an intermunicipal agreement with East Norriton, Plymouth and Whitpain Townships. This agreement addresses the use of facilities by each municipality, future facility enlargements, the sharing of capital costs, and the sharing of net operating costs.

In accordance with the existing agreement;

Reserved Capacity. Subject to the limitations and payment of charges set forth in this Agreement, East Norriton Township/East Norriton Township Municipal Authority, Plymouth Township/Plymouth Township Municipal Authority and Whitpain Township are granted the right during the term of this Agreement to discharge wastewater to the Treatment Plant to the extent of their respective Reserved Capacities, as determined initially and from time to time pursuant to the terms of this Agreement.

In addition;

a.) Each Municipality agrees that the wastewater it discharges will not exceed certain maximum allowable discharge limits, expressed in pounds per day, which will be based upon the concentration limits attributable to domestic waste, as referenced in Article I, and the hydraulic capacity reserved for it, as determined in Article II.

b.) Joint Sewer Authority shall issue a warning to a Municipality when its maximum 3-month average flow or attendant loading of either of the pollutants referenced above approaches 85 percent of its respective maximum limit. The maximum 3-month average flow criteria is based on current federal and state standards and may be changed from time to

time to reflect the federal and state standards in effect at any time. Within thirty (30) days after the warning, the Municipality shall initiate and within ninety (90) days thereafter complete and submit to the Joint Authority an engineering report, which at a minimum addresses the estimated time frame in which the Municipality will completely utilize its hydraulic or pollutant loading capacity.

c.) When the maximum 3-month flow or attendant loading of either of the pollutants referenced above approaches 90 percent of a Municipality's maximum limit, the Joint Sewer Authority will determine how much unused capacity is available for such Municipality and will be dividing said unused capacity by 275 gallons per day, as such amount may be amended from time to time by the Joint Sewer Authority, determine how many EDUs are available to be connected by said Municipality. This determination will be valid as of the date of the calculation and may be recalculated each year. The Municipality will not be permitted to connect any EDUs in excess of the number determined by the Joint Sewer Authority.

d.) In the event that a Municipality shall exceed any of the limits and restrictions on flow or pollutant loadings, as set forth herein, for a period of thirty (30) consecutive days, such Municipality shall take immediate steps to reduce such overloading to the satisfaction of the Joint Sewer Authority and shall not make any connections until such overloading has been reduced to 85 percent of the Municipality's maximum limit. Furthermore, the Municipality in addition to other payments herein provided for and in addition to any other remedies legally available to the Joint Sewer Authority, shall indemnify and hold harmless the Joint Sewer Authority from any costs, fees, expenses, damages, fines, penalties, including legal, engineering or other fees and expenses,

suffered or incurred as a result thereof, except such as are caused by negligence in operation of the Treatment Plant.

3. Provisions of Rights-of-Way, Easements, and Land Transfers

Any interceptor improvements would occur in existing rights-of-way and easements. If any improvements would require the acquisition of rights-of-way, this effort would not begin until the preliminary design phase. Improvements and upgrades to the wastewater treatment plant are expected to occur on plant property, requiring no right-of-way or easement acquisition.

4. Other Sewage Facility Plan Adoptions

East Norriton Township, Plymouth Township, and Whitpain Township will have their own Act 537 Plans in place. These plans supply the supporting documentation for the projected wastewater flows used in this Plan. Refer to copies of the main text of these municipal plans found in Appendix C.

5. Legal Documents

Refer to Section VII.C.2. of this Plan which details the intermunicipal agreements among the participating municipal entities.

6. Dates and Time Frames of 1 through 5 above

Refer to the implementation schedules detailed in the Appendix B of this Plan.

VIII. SELECTED WASTEWATER TREATMENT AND INSTIUTIONAL ALTERNATIVE

A. Identify the Chosen Technical Alternative.

The selected alternative which best meets the immediate and future wastewater treatment needs of the planning area is the implementation of Alternative 1 which includes the following unit process upgrades:

- Add one 60-foot diameter primary clarifier;
- Add one 680,000-gallon aeration tank in parallel to the existing units;
- Add one 70-foot diameter secondary clarifier;
- Add one 92,000-gallon chlorine contact tank.
- Upgrades to the return activated and waste activated sludge pumping systems.
- Piping and structure additions for distribution of wastewater.

In addition, those line items detailed in the ENPWJSA Correction Action Plan should be implemented. These include all items as listed, in Section V of this Plan.

The above referenced improvements will allow for an expanded facility capacity of 8.67 MGD average daily flow and 11.29 MGD 3-month maximum flow.

These recommendations are based on the following:

1. Existing Wastewater Disposal Needs

Currently the ENPWJSA wastewater treatment plant provides advanced secondary treatment for an average permitted flow of 8.1 MGD. The plant is permitted to discharge 9.3 MGD maximum monthly flow.

The annual average flow for 2004 was 6.45 MGD and the highest consecutive maximum three-month flow for 2004 was 7.75 MGD. These are below the permitted limits.

However, of immediate concern, is the implementation of the Correction Action Plan projects to address high flows realized during significant rain events (see Appendix A). Implementation of these measures will enable the ENPWJSA to continue to meet the municipal needs as the base wastewater treatment needs increase.

2. Future Wastewater Treatment Needs.

The proposed facility improvements will enable the ENPWSJA to increase their treatment capacity. The projected design capacities will be divided among participating municipalities as follows:

Municipality	Projected Municipal Average Daily Flow (MGD)	Projected 3-month Maximum Flow (MGD)
Plymouth Township	3.60	4.49
East Norriton Township	2.70	3.30
Whitpain Township	2.37	3.50
Totals	**8.67**	**11.29**

Given that the participating municipalities predict that they will exceed their respective allocations, upgraded facilities will be necessary to meet future sewage disposal needs.

3. Operations and Maintenance Considerations

Implementation of Alternative 1 will provide a means for the Authority to have a buffer in place in the event of higher influent flows, given the addition of a primary clarifier among the other recommended unit process upgrades. Although influent

BOD has been historically low at the WWTP, BOD reduction that the primary clarifier affords for the increased flow could assist operations staff with their ability to nitrify and denitrify in the activated sludge process.

Additionally, without the construction of the additional primary clarifier, there is the risk that more solids will settle in the secondary clarifiers creating a build-up in the sludge blanket. Also, an additional primary clarifier will allow staff to take other clarifiers out of service for maintenance.

4. Cost Effectiveness.

Upon comparing the capital cost opinions associated with Alternatives 1 and 2, Alternative 2 is the most cost effective. However, given that Alternative 1 could provide operations and maintenance advantages (since it will have another primary clarifier), Alternative 1 appears to be a better selection.

5. Available Management and Administrative Systems.

The ENPWJSA currently has the necessary operation, maintenance, and administrative staff in place to manage the existing as well as upgrade facilities.

6. Available Financing Methods.

Of the financing methods discussed in Section VI of the Plan, each method can provide the necessary funding for the selected alternative. Refer to Section VIII.B. for the selected capital financing plan.

7. Environmental Soundness.

Environmentally, the proposed upgraded wastewater treatment plant will be able to adequately treat the projected municipal needs and maintain permitted effluent limits.

B. Selected Capital Financing Plan

The selected alternative will be funded by each of the participating municipalities in accordance with the current intermunicipal agreement. The ENPWJSA will consider financing the proposed upgrades via a municipal bond issue. However, the ENPWJSA will review all financial options available to it. It should be noted that funding for installation of a new aeration tank will be accomplished through the use of bond proceeds that the Authority currently has.

APPENDICES

APPENDIX A

CORRECTIVE ACTION PLAN

EAST NORRITON-PLYMOUTH-WHITPAIN JOINT SEWER AUTHORITY

CORRECTIVE ACTION PLAN (CAP)

WASTEWATER TREATMENT FACILITY AND SAWMILL RUN PUMPING STATION

I. INTRODUCTION

The East Norriton-Plymouth-Whitpain Joint Sewer Authority (Authority) owns, operates and maintains the wastewater treatment facility (WWTF) and Sawmill Run Pumping Station (Sawmill) that serves customers within East Norriton, Plymouth and Whitpain Townships. The Authority also owns, operates and maintains force mains and interceptors that originate at Sawmill and end at the WWTF. Sawmill is equipped with three (3) constant speed pumps rated at 2.44 MGD each and three (3) variable speed pumps rated at 7.57 MGD each. The control scheme for Sawmill is currently designed and configured such that a maximum of two (2) constant speed and two (2) variable speed pumps can be operated at one time. When all four (4) pumps are operating, the total calculated capacity of Sawmill is 17.2 MGD. The Authority has completed the installation of a Supervisory Control and Data Acquisition System (SCADA) that will provide detailed operational data with regard to Sawmill Run Pump Station and the WWTF. This tool is critical to the success of preventing future overflows by illustrating flows, wet well and tank levels during significant rain events that currently must be estimated. It will also generate a more expedient response by Authority personnel to critical high water conditions.

Both the wet well at Sawmill and the manhole immediately upstream within the East Norriton Township sewerage system have experienced overflows during significant rain events. This became evident during calendar years of 2003 and 2004, two of the wettest years on record. Authority personnel have reported overflows at both locations to PADEP as overflows at Sawmill. Generally, the noted manhole will be the first to overflow. There are no documented overflows of Whitpain or Plymouth Township's sewerage in the vicinity of Sawmill. It appears as though there are hydraulic restrictions at Sawmill that may impede the ability of flow from East Norriton Township to enter the wet well as readily as flow from the other two (2) Townships.

Two (2) 24-inch diameter force mains extend from Sawmill to the gravity interceptors. One force main services the three (3) constant speed pumps at Sawmill; the other the three (3) variable speed pumps. The force mains are cross-connected and valved at the station to allow flow from either group of pumps to either force main. The force main from the variable speed pumps discharges to a newer 30-inch gravity interceptor while the force main from the constant speed pumps discharges to an older 18-inch gravity interceptor before discharging into the same 30-inch gravity interceptor sewer (at the intersection of Fornance Street and Sandy Hill Road) as the variable speed pumps. The 30-inch gravity interceptor extends from the intersection of Plymouth Boulevard and Fornance Street to the intersection of Fairfield Avenue and Jefferson Street. From this point, the diameter of the interceptor increases to 36 inches until the intersection of Ridge Pike and Ross Street. The interceptor then discharges to a junction box, which splits into two (2) 24-inch parallel gravity interceptors that extend the length of Ross Street to the head of the WWTF. Due to the configuration of the junction box, flow between the two (2) 24-inch interceptors is not equalized. This has resulted in one of the two parallel 24-inch gravity interceptors overflowing during significant rain events. In 2003, the Authority employed a contractor to install an equalization pipe between two manholes along the Ross Street parallel sewers. This resulted in a more "evening" of the flow and has a reduced the number of overflow events but due to the hydraulic configuration, has not eliminated them. A diagram of the conveyance system of the Pump Station and Force Main is included as Exhibit A.

II. CONNECTION MANAGEMENT PLAN

In February 2005, the Authority directed its consulting engineer, prior to the receipt of any issued "Notice of Violations," to conduct a hydraulic study of Sawmill, the force mains and gravity interceptors to identify the deficiencies during high flow events and to delineate a capital improvement plan to be undertaken by the Authority to avoid further surcharges and overflows. Completion of this study and the resulting capital improvements are included as milestones to this Corrective Action Plan (CAP). Also included is a requested Connection Management Plan (CMP). This plan is sensitive to the duties of both PADEP and the municipalities to ensure that overflows are promptly corrected but considers the responsibility of the townships to continue serving their respective communities and the potential for litigation that could have a deleterious effect on the community at large. A High Flow Maintenance Plan (HFMP) is also included as Exhibit E to delineate for PADEP the steps taken during high flow conditions at the WWTF.

Enclosed as Exhibit B are copies of the proposed connection requests for each municipality with appropriate planning code numbers as requested by PADEP. They are prioritized 1, 2 and 3 and the number requested for approval are identified with each milestone in the following section of this CAP.

As a clarification, the service area of Plymouth Township that generates flow which is measured by the Chemical Road meter at the WWTF and which does not utilize Sawmill, the force mains or gravity interceptors, including the Ross Street Junction Box, previously described is not subject to a prohibition of connections and is not included in this CAP. This is primarily due to the methodology the Authority employs during high flow conditions. This is discussed within the HFMP attached to this document. A system map attached and labeled Exhibit C illustrates the approximate area. The purpose of the GIS layout is a general scheme of the contributing Townships' sanitary sewer conveyance.

TABLE 1

Summary of Connection Requests by Priority

	East Norriton Township	Plymouth Township	Whitpain Township	TOTAL
Remaining Priority 1 Connections with Approved Planning Modules	214	2	97	313
Remaining Priority 1 Connections	33	23	64	120
Remaining Priority 2 Connections	267	0	265	532
Remaining Priority 3 Connections	440	0	520	960
Remaining Priority 3 Connections with Approved Planning Modules	28	0	0	28
TOTALS	982	25	946	1953

III. CORRECTIVE ACTION MILESTONES

A. Milestone 1: -- June 1, 2005

1. The Authority has completed the construction of a SCADA Project that will assist in monitoring, alarming and controlling the operation at Sawmill and the WWTF. The SCADA system went into operation on May 13, 2005, and is essentially complete except for minor software programming issues.

B. Milestone 2: -- Due August 15, 2005

1. The Authority will execute a consent order and agreement with PADEP.

2. The Authority proposes the correction of a hydraulic restriction within the junction box at Main and Ross Streets to provide a more suitable balance between the two 24-inch gravity interceptors that extend down Ross Street to the WWTF.

   a. In response to the comment concerning the Ross Street Junction Box of Milestone 2 in the June 16, 2005 letter from PADEP, the Authority intends to take a two-step approach. First, the hydraulic analysis illustrates the flow balance between the two-24 inch mains under maximum pumping conditions from the Sawmill Pumping Station to be approximately 2/3 to 1/3. The main carrying 2/3 of the maximum flow has experienced an overflow at a shallow manhole immediately upstream of a "flat" area of the interceptor. The immediate resolution to comply with this Milestone will be to install a diversion baffle within the junction box to correct the flow distribution imbalance. The configuration of this baffle is presently under review. The second step involves further hydraulic analysis to determine if replacing and reconfiguring the junction box is an appropriate long-term fix in conjunction with a potential increase in the Sawmill Pumping Station capacity. A schematic of the current conditions within the junction box and the flow imbalance along with the associated hydraulic calculations are included as Exhibit D. A proposed design will become available when the analysis is complete. In response to the comment by the PADEP in the June 16, 2005 letter, reinstallation of one of the two 24-inch parallel gravity interceptors at a lower elevation will not improve the total carrying capacity of the Ross Street interceptors.

3. In consideration of completion of Item Nos. 1 and 2 of this milestone, the Authority respectfully requests approval of PADEP to allow Priority 1 connections that have Department approved planning modules.

C. Milestone 3 -- Due September 1, 2005

1. The Authority engineer will complete the hydraulic analysis of Sawmill, the force mains, and gravity interceptors, which convey flow from the three (3) townships to the WWTF. This plan will delineate in detail further capital improvements necessary to accommodate flows during significant rain events.

   a. In response to a comment concerning the hydraulic analysis in the June 16, 2005 letter from PADEP, please be advised that during 2004, the Authority undertook a six-week metering program at numerous locations along the interceptor to capture wet and dry weather flow data. This, coupled with flow data from the Sawmill Pumping Station

and the wastewater treatment plant, has provided sufficient information for the analysis. This hydraulic analysis considers bends within the force main and the slope of the gravity sewers.

2. The Authority will formally adopt a capital improvement plan and secure the necessary financing to embark on completing the delineated improvements. This will be done by formal resolution of the Board with the consensus of the participating municipalities.

3. In consideration of completion of Item Nos. 1 and 2 of this milestone, the Authority respectfully requests approval of PADEP to allow the remaining balance of Priority 1 connections.

D. Milestone 4: -- Due September 15, 2005

1. The Authority will modify the controls at Sawmill to operate five (5) or six (6) of the available pumps to more effectively and efficiently pass the flow downstream. Preliminary results from the hydraulic analysis indicate this may be possible following modification of the junction box at Main and Ross Streets noted in Milestone 2.

E. Milestone 5: -- Due September 30, 2005

1. The Authority will provide auxiliary pumping within the raw sewage junction box at WWTF to better evacuate the flows within the two (2) 24-inch interceptors on Ross Street and assist in preventing backwater influence at the point where overflows have previously occurred. The Authority acknowledges that a Part II Construction Permit will be needed for this installation. It also should be noted that the results of the hydraulic analysis may provide an alternate solution.

   a. In response to the Chemical Road Sewer Shed Prohibition comment in the June 16, 2005 letter from PADEP, please be advised that the raw sewage from the Chemical Road Pump Station flows through the plant in a dedicated and separate 24" diameter pipe until it combines with the flow from the Ross Street interceptors in a junction box that precedes the Building B-1 wetwell. Under significant storm flow events, the flow is diverted around the wetwell to the East Trickling Filter Plant primary clarifiers as described in the attached HFMP.

2. The Authority respectfully requests with the completion of this milestone approval of planning modules by the Department for the Priority 2 projects and for the approval of their associated connections.

F. Milestone 6: -- Due March 1, 2006

1. The Authority recently upgraded the raw sewage pumps for the trickling filter treatment system at the WWTF. This improvement has reduced the magnitude of the sewage overflows from the Ross Street Interceptor.

2. The Authority proposes to replace and upgrade the raw sewage pumps for the activated sludge treatment system to prevent any backwater influences upon entry to the WWTF.

   a. The June 16, 2005 letter from PADEP commented that the Authority would need a Part II construction permit for the replacement and upgrade of the three (3) Activated Sludge Plant raw sewage pumps. The Authority disagrees that a permit is required as this is a maintenance project where the twenty-five year old pumps are to be replaced with newer pumps of the same pumping capacity as presently permitted. The existing pumps have aged and do not perform to their peak capability. The only upgrade will exist within the controls of the pumps, not the pumps themselves. All new pumps are to be operated by variable frequency drives.

3. Upon completion of this milestone, the Authority respectfully requests the approval of planning modules for Priority 3 projects and the respective connections for all three (3) townships.

G. Milestone 7: -- Due December 31, 2007

1. The Authority will complete the work delineated in the capital improvement program noted in Milestone 3, completion of the work mentioned in the capital improvement program governing Sawmill, the force mains and gravity interceptors.

2. Upon completion of the aforementioned work, and the absence of further overflows, the Authority respectfully requests release from the CAP by the Department.

IV. INFLOW/INFILTRATION MITIGATION

As noted earlier, during the years of 2003 and 2004, this area of southeastern Pennsylvania received unusually high amounts of precipitation. The East Norriton-Plymouth-Whitpain Joint Sewer Authority, as well as numerous other entities experienced significantly increased amounts of sanitary sewer flows, which ultimately challenged the capacity of the conveyance system. The Authority and associated municipalities exercised, and continue to exercise, extensive efforts to significantly reduce the amount of ground/surface water that may enter the conveyance system via

inflow/infiltration. Each municipality has implemented a proactive plan to diminish the amount of ground/surface water from entering the sanitary sewer system. Attached as Exhibit F are details of the historic activities as well as those proposed. All three (3) townships will continue their aggressive approach to mitigation of I/I within their respective collection systems. As an on-going part of the Chapter 94 review process for 2006, 2007 and 2008, the Authority will provide PADEP with an update of the success of the I/I programs in each municipality.

The East Norriton-Plymouth-Whitpain Joint Sewer Authority provides this information as a courtesy to PADEP in that the Authority does not govern nor operate the collection systems of the three (3) townships and has no I/I issues of its own. The Authority also requests that if we can demonstrate additional capacity has been created by the aggressive I/I program of the three (3) townships before the date of the final milestone (December 31, 2007) described herein, that the PADEP will release the Authority and associated municipalities from any moratorium or prohibition and consider the Corrective Action Plan satisfied.

V. AUTHORITY RESPONSIBILITY

The Authority recognizes its responsibility toward proper operation of their conveyance system and the WWTF. The Authority will rigorously administer and enforce all elements of this schedule. It will be clearly communicated to each member municipality and the Authority will require each to agree to meet these milestones and accept all limitations of service. As requested by the PADEP, Quarterly reports will be supplied on by the 15th day of the month following each calendar quarter until the PADEP has lifted the sanitary sewer connection prohibition.

EXHIBIT A

SCHEMATIC OF

EAST NORRITON-PLYMOUTH-WHITPAIN JOINT SEWER AUTHORITY

CONVEYANCE FACILITIES

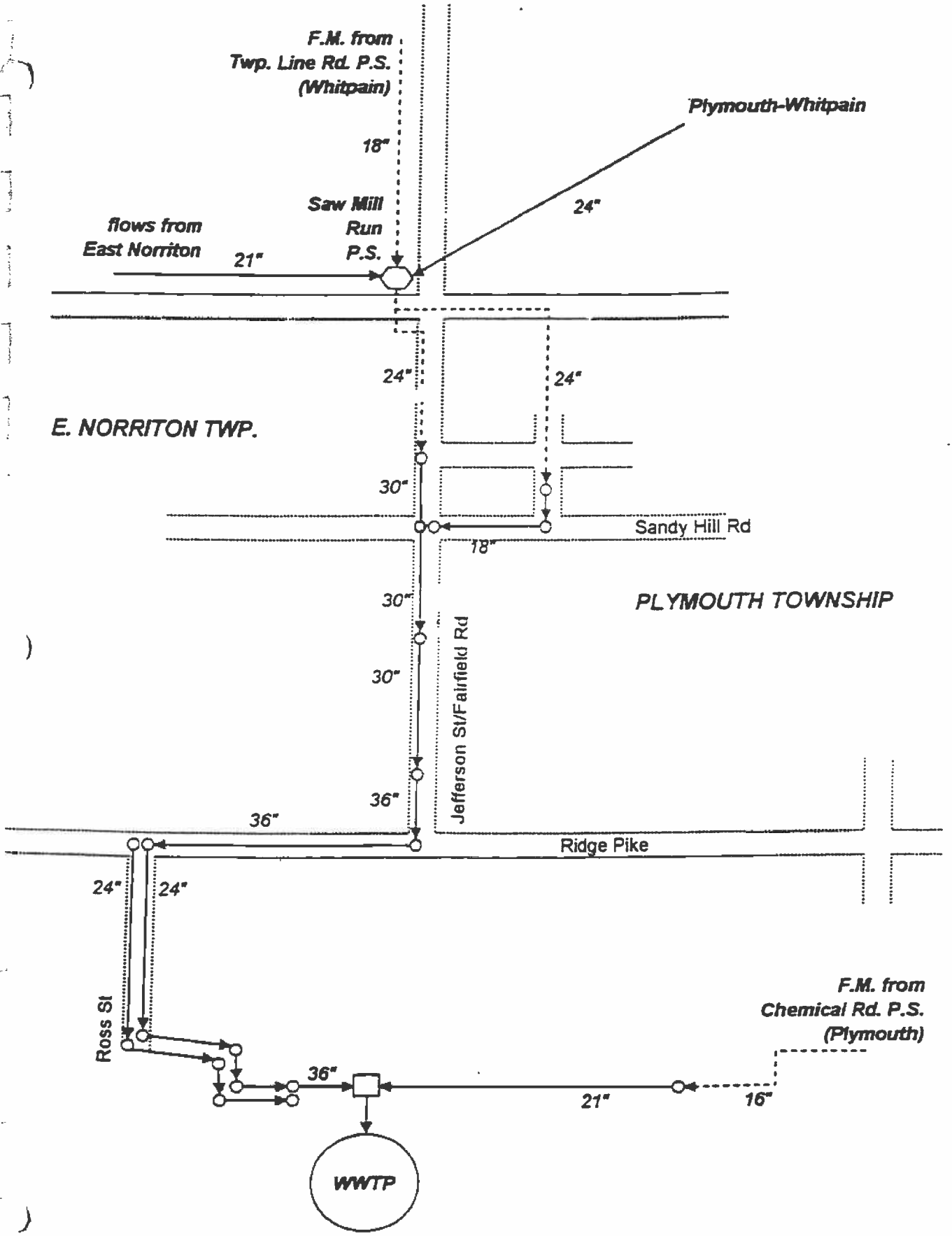

F.M. from
Twp. Line Rd. P.S.
(Whitpain)
18"
Plymouth-Whitpain
24"
Saw Mill
Run
P.S.
flows from
East Norriton
21"
24"
24"
E. NORRITON TWP.
30"
Sandy Hill Rd
18"
PLYMOUTH TOWNSHIP
30"
30"
Jefferson St/Fairfield Rd
36"
36"
Ridge Pike
24"
24"
Ross St
F.M. from
Chemical Rd. P.S.
(Plymouth)
36"
21"
16"
WWTP

EXHIBIT A

EXHIBIT B

EAST NORRITON-PLYMOUTH-WHITPAIN JOINT SEWER AUTHORITY

CONNECTION MANAGEMENT PLAN

EXHIBIT B.1

East Norriton Township Connection Management

Last Revised: 06/25/05

PMA - Planning Module Approved
PHR - Pump & Haul Request
E - Exception Requested -Replacement Flow

	Development	DEP CODE	EDUs Required	Planning Module Approved - Exception # EDU's	Subdivision or Land Development Plan Approved	EDU's Paid	Permits Issued or Existing EDU's or Replacement Flows	EDUs Needed	Pump & Haul	Priority
1	Reserve @ Penn Crossing - Cutler - 78 EDU's Approved 2003 Paid in Full	ENPWJSA	78	78 PMA	Y	78	9 Permits	39	PHR	1
2	Mercy Suburban Hospital - **Requesting Exemption - Facility Public Need**	ENPWJSA	16	16 E	Y	N	-	16		1
3	Pimlico Farms - Gambone - **35 EDU's Approved 1998** Paid for 46 - 5/24/05	ENPWJSA	46	35 PMA	Y	N	-	35	PHR	1
4	Jefferson Crossing - Philomeno/Salamone - **Replacing existing 34 EDU's**	ENPWJSA	84	34 E	Y	N	34 Replacement	50		1
	from Jefferson House Rest.									
5	Heatherwood - Erb/Mascio/Gambone	1-46926-118-3J	28	N	Y	N	-	28	PHR	1
6	Dr Valenza - Germantown Pike/N Wales Road	ENPWJSA	8	N	Y	N	-	8	PHR	1
7	MRA Carwash - Germantown Pike - 2EDU's Present	ENPWJSA	8	N	Y	N	2 Replacement	6		1
8	Calamia - Erb/Mascio - 3 EDU's present connection	ENPWJSA	10	N	N	N	3 Replacement	8	PHR	1
9	Eric Winchester - 117 Hancock Ave - Single Home on last remaining vacant lot	ENPWJSA	1	N	Y	N	-	1		1
10	DeStefano - Bristol Ave - Single Home on vacant lot	ENPWJSA	1	N	Y	N	-	1		1
11	Crowley Foods - Gambone	ENPWJSA	5	N	Y	N	-	5	PHR	1
12	Pat Bradley - Barbara Drive - Single Home on Vacant Lot	ENPWJSA	1	N	Y	N	-	1		1
13	Kinder Care - Tornetta **Bentwood - 236 EDU's Approved 1998 - 58 EDU's Paid 1998**	1-46926-J04-E	4	236 PMA	Y	58	5 Permits	4		1
14	Norriton Business Campus - 58 EDU's Approved in 1988	ENPWJSA	10	58 PMA	Y	58	28 Permits	10	PHR	1
15	Moreland Dev. - Bank - Whitehall/Germantown - Last pad of 3 pad site	ENPWJSA	10	25 PMA	Y	N	2 Permits	10		1
16	Northwood - Tornetta **(request transfer 30 EDU's (5 EDU's existing) of approved 58 EDU's**	ENPWJSA	30	N	N	N	5 Replacement	25		1
	paid for for in 1998. The Bentwood Project received approval for 236 EDU's in 1998									
	TOTAL REQUESTED PRIORITY NO. 1		340					247		
1	Reserve @ Penn Crossing - Cutler - Remaining Connection	ENPWJSA	30	30 PMA	Y	78	-	30	PHR	2
2	Pimlico Farms - Gambone - Remaining Connections	ENPWJSA	11	35 PMA	Y	N	-	11	PHR	2
3	Norriton Business Campus - **58 EDU's Approved in 1988**	ENPWJSA	20	58 PMA	Y	Y	28 Permits	20	PHR	2
4	Gorman Welding	ENPWJSA	5	N	N	N	-	5		2
5	DeKalb Apartments - DeKalb Pike	ENPWJSA	40	N	N	N	-	40		2
6	Waterworks - DeKalb Pike & Johnson Highway	ENPWJSA	40	N	N	N	-	40		2
7	Northwood - Tornetta - **Request to transfer from Bentwood Project approved EDU's**	ENPWJSA	120	N	N	N	-	120		2
8	Mobley Subdivision	ENPWJSA	1	N	N	N		1		2
	TOTAL REQUESTED PRIORITY NO. 2		267					267		
1	Waterworks - DeKalb Pike & Johnson Highway	ENPWJSA	26	N	N	N	-	26		3
2	DeKalb Apartments - DeKalb Pike	ENPWJSA	40	N	N	N	-	40		3

EXHIBIT B.1

East Norriton Township Connection Management

Last Revised: 06/25/05

PMA - Planning Module Approved
PHR - Pump & Haul Request
E - Exception Requested -Replacement Flow

	Development	DEP CODE	EDUs Required	Planning Module Approved - Exception # EDU's	Subdivision or Land Development Plan Approved	EDU's Paid	Permits Issued or Existing EDU's or Replacement Flows	EDUs Needed	Pump & Haul	Priority
3	Miller Electric - End of Felton Rd	ENPWJSA	10	N	N	N	-	10	PHR	3
4	Piantone/Brance - Whitehall Road	ENPWJSA	20	N	N	N	3 Replacement	17	PHR	3
5	Del Markward - 911 W. Germantown Pk	ENPWJSA	55	N	N	N	-	55	PHR	3
6	Bentwood Flex Development - **Remaining Project EDU's**	ENPWJSA	28	Y	Y	N	-	28		3
7	District Court Office Building	ENPWJSA	15	N	N	N		15		3
8	Clements Meat Market - Old Arch Road	ENPWJSA	20	N	N	N	3 Replacement	17		3
9	FAILED SEPTIC SYSTEMS THROUGHOUT TWP	ENPWJSA	20	NA	NA	NA	-	20		3
10	NORTHWOODS - 150 CREDITED BACK TO BENTWOOD	ENPWJSA	240	N	N	N		240		3
	TOTAL REQUESTED PRIORITY NO. 3		474				-	468		

Priority 1	340	**247**
Priority 2	267	267
Priority 3	474	468
	1081	982

Definitions:

Priority 1 - Connections desired ASAP **247**
Priority 2 - Connections desired between 6 months and 1 year **267**
Priority 3 - Connections desired beyond first year **468**

EXHIBIT B.2

Plymouth Township Connection Management

Ross Street Interceptor Connections Only
Last Revised: 06/28/05

Development	DEP CODE	EDUs	Planning Module Approved or Exemption	Subdivision or Land Development Plan Approved	Fee Paid	Permits Issued	EDUs Still Needed	Priority
500 Township Line Road (3,200 SF Commercial)	1-46944-189-E	2	Y	Y	N	N	2	1
Cusomono Tract (12 Single Famliy Lots)	ENPWJSA	12	N	N	N	N	12	2
Placitelli Tract (6 Single Family Lots)	ENPWJSA	6	N	N	N	N	6	2
Miller Tract (5 Single Family Lots)	ENPWJSA	5	N	N	N	N	5	2
		25					25	

Priority 1 with Approved Planning Module	2	2
Remaining Priority 1	23	23
	25	25

Definitions:

Priority 1 - Connections desired ASAP

Priority 2 - Connections desired between 6 months and 1 year

Priority 3 - Connections desired beyond first year

EXHIBIT B.3

Revised

Whitpain Township Connection Management

Last Revised: 06/27/05

Development	DEP Code #	EDUs	Planning Module Approved or Exemption	Subdivision or Land Development Plan Approved	Fee Paid	Permits Issued	EDUs Still Needed	Priority
Latham Realty - Phase 1	1-46961-207-E	35	Y	Y	22	15	20	1
Amberley at Blue Bell (Phase I)	1-46961-228-E	88	Y	Y	Y	54	34	1
Better Living Homes	1-46961-224-3IJ	2	Y	Y	Y	2	-	1
Breen Tract (3-Lots)	1-46961-236-E	2	Y	Y	N	-	2	1
Foxcroft 1 & II	1-46961-217-E	97	Y	Y	Y	90	7	1
1905 - 1907 Skippack Pike	1-46961-102-4	2	Y	Y	Y	2	-	1
Phipps' Station	1-46961-223-E	16	Y	Conditional	N	-	16	1
630/646 Skippack Pk (Centre Sq. Assoc.)	1-46961-226-E	5	Y	Conditional	N	-	5	1
Penn Liberty Bank	N/A * (See Footnote 1)	2	N/A	Conditional	N	-	2	1
860 Penllyn Blue Bell Pike	N/A * (See Footnote 2)	11	Y	Conditional	N	-	11	1
Wawa - 202 & 73		24	N	Conditional	N	-	24	1
Tall Oaks (3 lots)	1-46961-232-3J	3	N	Conditional	N	-	3	1
MCCC Advanced Technology Center	1-46961-240-3J	27	N	Conditional	N	-	27	1
Miscellaneous Redevelopment / Infill		10	N	N	N	-	10	1
Amberley at Blue Bell (Phase II)	1-46961-225-3J	31	N	Conditional	N	-	31	2
Blue Bell Corp. Ctr. - 2004 (Unisys) Phase I		200	N	N	N	-	200	2
Kendrick Hill		9	N	N	N	-	9	2
Miscellaneous Redevelopment / Infill		25	N	N	N	-	25	2
Blue Bell Corp. Ctr. - 2004 (Unisys) Phase II		276	N	N	N	-	276	3
Latham Realty - Phase 2	1-46961-207-E	100	Y	Y	N	-	100	3
1950 Skippack Pike		11	N	Conditional	N	-	11	3
Kowalski - Mehr		20	N	N	N	-	20	3
1860 Skippack Pike		30	N	N	N	-	30	3
Anderson/Lake Tracts		33	N	N	N	-	33	3
Miscellaneous Redevelopment / Infill		50	N	N	N	-	50	3
		1109				163	946	

Priority 1 with Approved Planning Module	260	97
Remaining Priority 1	64	64

EXHIBIT B.3

Revised

Whitpain Township Connection Management

Last Revised: 06/27/05

Development	DEP Code #	EDUs	Planning Module Approved or Exemption	Subdivision or Land Development Plan Approved	Fee Paid	Permits Issued	EDUs Still Needed	Priority
Priority 2		265					265	
Priority 3		520					520	
		1,109					946	

Priority 1 Issued Permits from DEP 1st Release

Latham Realty - Phase 1	11	
Better Living Homes	1	
Foxcroft 1 & II	18	(Please See Footnote 3)
1905-1907 Skippack Pike	2	
Total	32	

Definitions:

Priority 1 - Connections desired ASAP

Priority 2 - Connections desired between 6 months and 1 year

Priority 3 - Connections desired beyond first year

Footnote (1) Project requires only 350 GPD of additional capacity

Footnote (2) Land development plan application approved 10/02/95 code number unavailable in file.

Footnote (3) - Please note that the original submittal was inaccurate regarding the number of permits issued for Foxcroft I & II. As of April 19, 2005, 37 units were under construction, but 35 units were already completed and occupied.
Therefore, permits issued should have been 72 and permits required should have been 25. Also, 18 EDUs were allocated from the first release, bringing the current number of required connections to 7.

EXHIBIT C

EAST NORRITON-PLYMOUTH-WHITPAIN JOINT SEWER AUTHORITY

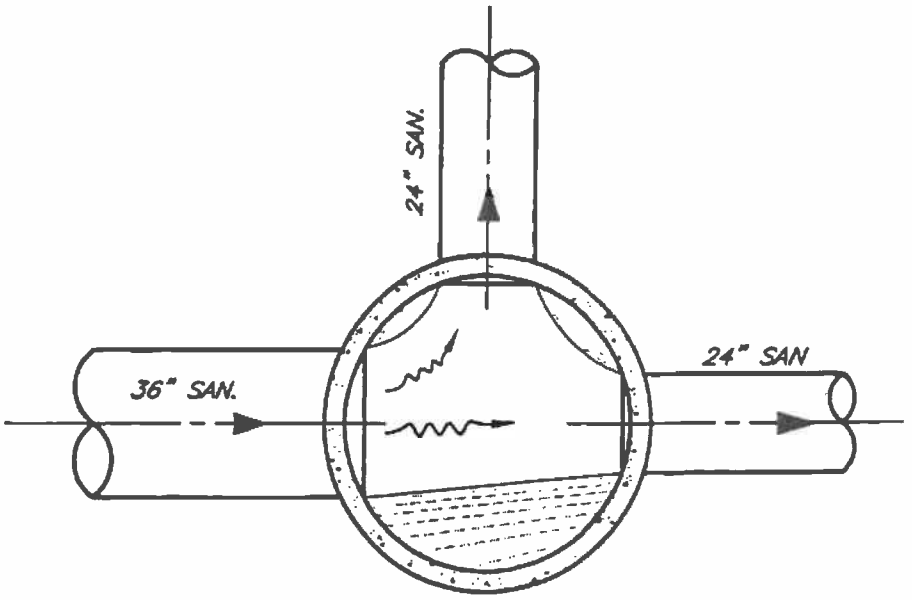
BASE SEWER SYSTEM MAP

See Appendix D of this 537 Planning Document

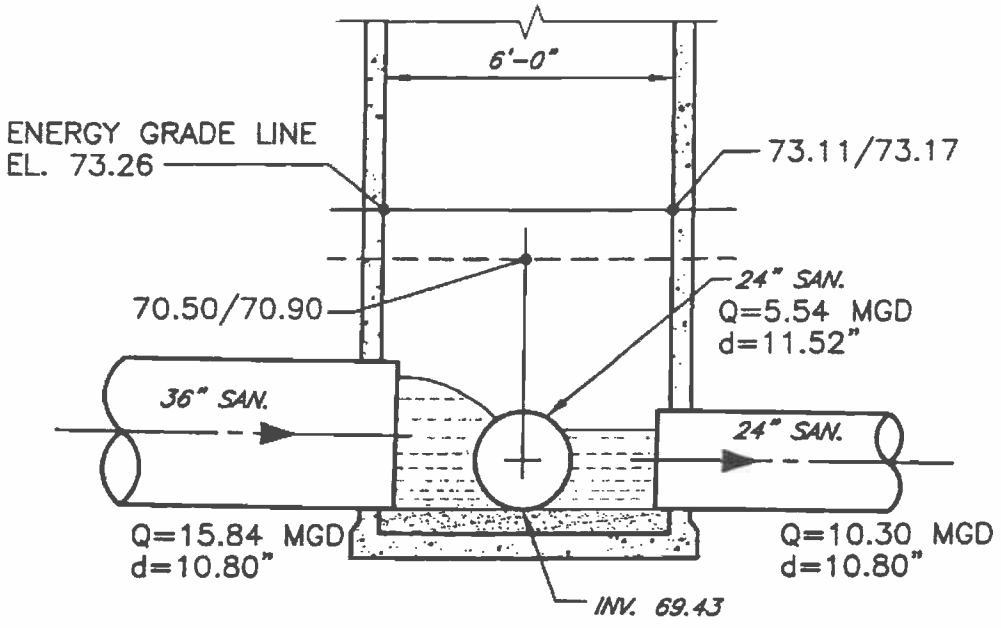
EXHIBIT D

EAST NORRITON-PLYMOUTH-WHITPAIN JOINT SEWER AUTHORITY

SAWMILL RUN INTERCEPTOR JUNCTION MANHOLE 11 AND SAWMILL RUN INTERCEPTOR HYDRAULIC ANALYSIS



SECTIONAL PLAN



SECTION

ARRO Consulting, Inc.

Suite 100, 549 North Lewis Road
Limerick, Pennsylvania 19468-1234
Tel. 610-495-0303

EXHIBIT D

SAWMILL RUN INTERCEPTOR
JUNCTION MANHOLE 11

Date: May 2005
Project No:
Proj. Name:
6/30/05 17:00

ARRO

Computed By: J. R. Jackson
Checked By:
Sheet:

EAST NORRITON-PLYMOUTH-WHITPAIN JOINT SEWER AUTHORITY
WASTEWATER TREATMENT PLANT

SAWMILL RUN INTERCEPTOR HYDRAULIC ANALYSIS

TWO EXISTING 24" DIAMETER ROSS STREET INTERCEPTOR PIPES
PRESENT MAXIMUM DAILY FLOW = 15.84 MGD (TWO CONSTANT SPEED PLUS TWO VARIABLE SPEED SAWMILL RUN PUMPS)

	Avg. Daily Flow (MGD)	Peaking Factor		Peak Hourly Flow (MGD)						
Sawmill Interceptor Design Flow =	7.054	2.2455	=	15.84	MGD	=	24.51	CFS	=	11,000 GPM
Plymouth Meter Design Flow =	1.062	2.99	=	3.18	MGD	=	4.91	CFS	=	2,205 GPM
	8.116			19.01	MGD					

A. FROM MAIN PUMP STATION WETWELL TO MAIN PUMP STATION ENTRANCE

T/WALL 61.42

	Description	"g" (ft/sec^2)	Width (feet)	Flow (MGD)	Flow/Width (cfs/ft)	Depth (feet)	Inv. El. (feet)	Level, El. (feet)	EGL (feet)
1	Critical Depth at Channel Opening to Wetwell	32.2	3.17	9.19	4.49	0.86	57.37	58.23	58.23

2 Backwater Calculation in Effluent Channe	Depth of Flow (feet)	Width of Channel (feet)	Area of Flow (ft^2)	Wetted Perimeter (feet)	Hydraulic Radius, R (feet)	R^1.3333	Flow (MGD)	Mean Velocity (fps)	Kinetic Energy (ft)	Specific Energy, He (feet)
	0.8551	3.17	2.71	4.88	0.56	0.457	9.19	5.25	0.43	1.2824
	1.0095	3.17	3.20	5.19	0.62	0.525	9.19	4.44	0.31	1.3161
	Delta He (feet)	"n" Factor	Friction Slope, S (ft/ft)	Average S (ft/ft)	Exist slope of channel (ft/ft)	Exist Slope - Avg. Slope (ft/ft)	Length of Reach (feet)	Depth of Flow at Upstream Point (feet)	Upstream Floor Level, El. (feet)	EGL (feet)
	-0.0337	0.013	0.004609	0.003743	0.000000	-0.003743	9.00	1.01	57.43	58.44
		0.013	0.002877			Reach =	9.00			

Grinder Depth Downstream = 1.01 ft. = 12.11 in.

		Flow (MGD)	Flow (gpm)	Head Upstream (in)	Channel Invert	EGL (feet)	
						58.44	Overflow = 2.33 in.
3	Channel Monster Headloss (MODEL NO. 4010)	9.19	6,382	39.00	57.43	60.68	Overflows Weir, Need To Flow Balance
				Grinder Depth Upstream =		3.25 ft. =	39.00 in.

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WASTEWATER TREATMENT PLANT

SAWMILL RUN INTERCEPTOR HYDRAULIC ANALYSIS

TWO EXISTING 24" DIAMETER ROSS STREET INTERCEPTOR PIPES
PRESENT MAXIMUM DAILY FLOW = 15.84 MGD (TWO CONSTANT SPEED PLUS TWO VARIABLE SPEED SAWMILL RUN PUMPS)

		Length (feet)			Flow (MGD)	Water Height, h (in)		Top of Weir, El. (feet)	Water Level, El. (feet)	EGL (feet)
4	Flat Weir Plate without End Contractions	3.17			0.63	2.46		60.48	60.69	60.69
					0.02000					

	Depth of Flow (feet)	Width of Channel (feet)	Area of Flow (ft^2)	Wetted Perimeter (feet)	Hydraulic Radius, R (feet)	R^1.3333	Flow (MGD)	Mean Velocity (fps)	Kinetic Energy (ft)	Specific Energy, He (feet)
5 Backwater Calculation in Influent Channel	3.176604	3.17	10.07	9.52	1.06	1.077	9.19	1.41	0.03	3.21
From Grinder To Flow Intersection	3.1777	3.17	10.07	9.53	1.06	1.077	9.19	1.41	0.03	3.21
	Delta He (feet)	"n" Factor	Friction Slope, S (ft/ft)	Average S (ft/ft)	Exist slope of channel (ft/ft)	Exist Slope - Avg. Slope (ft/ft)	Length of Reach (feet)	Depth of Flow a Upstream Point (feet)	Upstream Floor Level, El. (feet)	EGL (feet)
	-0.0010	0.013	0.000142	0.000142	0.000000	-0.000142	7.25	3.18	57.50	60.68
		0.013	0.000141			Reach =	7.25			

		Depth of Flow (feet)	Width of Channel (feet)		"K" Factor	Flow (MGD)	Velocity (fps)	Kinetic Energy (ft)	Minor Head Loss (ft)		EGL (feet)
											60.68
6	Flow Bend Loss	3.18	4.00		0.25	9.19	1.12	0.02	0.00		60.68

	Depth of Flow (feet)	Width of Channel (feet)	Area of Flow (ft^2)	Wetted Perimeter (feet)	Hydraulic Radius, R (feet)	R^1.3333	Flow (MGD)	Mean Velocity (fps)	Kinetic Energy (ft)	Specific Energy, He (feet)
7 Backwater Calculation in Influent Channel	3.182509	4.00	12.73	10.37	1.23	1.315	9.19	1.12	0.02	3.20
From Bend to Flow Intersection	3.1832	4.00	12.73	10.37	1.23	1.315	9.19	1.12	0.02	3.20
	Delta He (feet)	"n" Factor	Friction Slope, S (ft/ft)	Average S (ft/ft)	Exist slope of channel (ft/ft)	Exist Slope - Avg. Slope (ft/ft)	Length of Reach (feet)	Depth of Flow a Upstream Point (feet)	Upstream Floor Level, El. (feet)	EGL (feet)
	-0.0006	0.013	0.000073	0.000073	0.000000	-0.000073	8.83	3.18	57.50	60.68
		0.013	0.000073			Reach =	8.83			

		Depth of Flow (feet)	Width of Channel (feet)		"K" Factor	Flow (MGD)	Velocity (fps)	Kinetic Energy (ft)	Minor Head Loss (ft)		EGL (feet)
											60.68
8	Flow Intersection Loss (Branch Flow)	3.18	4.00		0.90	19.01	2.31	0.08	0.07		60.76

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B. FROM MAIN WWTP PUMP STATION ENTRANCE TO DIVERSION CHAMBER DS-4

T/MH 74.00

		Diameter (inches)	Length (feet)	"C" Factor	"K" Factor	Flow (MGD)	Velocity (fps)	Kinetic Energy (ft)	Minor Head Loss (ft)	Friction Head Loss (ft)	EGL (feet)
											60.76
1	Manhole Exit	36			1.00	19.01	4.16	0.27	0.27		61.03
2	Ductile Iron Pipe	36	23	100		19.01				0.05	61.08
3	90 Deg. Bend	36			0.60	19.01	4.16	0.27	0.16		61.24
4	Ductile Iron Pipe	36	10	100		19.01				0.02	61.27
5	Entrance	36			0.50	19.01	4.16	0.27	0.13		61.40

		Diameter (inches)	Flow (MGD)	Flow (cfs)	Hw/D (from chart)	Headwater (feet)	Pipe Invert	EGL (feet)
6	Headwater Calculation at Pipe Entrance	36	19.01	29.42	0.88	2.64	58.08	60.72

C. FROM DIVERSION CHAMBER DS-4 TO MANHOLE MH1A

T/MH 75.33

	Description	Diameter (inches)	Length (feet)	"C" Factor	"K" Factor	Flow (MGD)	Velocity (fps)	0.0230 Kinetic Energy (ft)	Minor Head Loss (ft)	Friction Head Loss (ft)	EGL (feet)
											61.40
2	Manhole Entrance (Figure 8-11)	24			1.65	3.18	1.56	0.04	0.06		61.46
1	Ductile Iron Pipe	24	20	100		3.18				0.01	61.48

		n	1.486/n	Diameter (inches)	Length (feet)	Invert Down (feet)	Invert Up (feet)	Slope, S	S^0.50	Hydraulic Radius, Rh	Rh^.667	Velocity, V (fps)	Flow Area, A (ft^2)	Full Pipe Flow, Q (cfs)	Full Pipe Flow, Q (MGD)
4	Check Full Pipe Flow Velocity, V=(1.486/n)*(Rh)^(0.667)*(S)^(0.5)	0.013	114.308	24.00	100.00	62.21	58.08	0.0413	0.203	0.500	0.630	14.631	3.142	45.964	29.706

		Diameter (inches)	Actual Flow, q (MGD)	q/Q	d/D	Flow Depth, d (in)
5	Partial Pipe Flow Depth	24.00	3.18	0.11	0.22	5.28

		Headwater (feet)	Diameter (feet)	Radius (feet)	Chord (feet)	Interior Angle (degrees)	Arc (feet)	Flow Area (ft^2)	Actual Velocity (fps)	Kinetic Energy (ft)	EGL, down (feet)
6	Pipe Partial Depth Flow Area (Down)	0.4400	2.00	1.00	1.66	111.89	1.95	0.51	9.59	1.43	64.08

		Headwater (feet)	Diameter (feet)	Radius (feet)	Chord (feet)	Interior Angle (degrees)	Arc (feet)	Flow Area (ft^2)	Actual Velocity (fps)	Kinetic Energy (ft)	EGL, up (feet)
7	Pipe Partial Depth Flow Area (Up)	0.4400	2.00	1.00	1.66	111.89	1.95	0.51	9.59	1.43	64.08

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D. FROM MANHOLE MH1A TO MANHOLE MH2

T/MH 75.33

		n	1.486/n	Diameter (inches)	Length (feet)	Invert Down (feet)	Invert Up (feet)	Slope, S	S^0.50	Hydraulic Radius, Rh	Rh^.667	Velocity, V (fps)	Flow Area, A (ft^2)	Full Pipe Flow, Q (cfs)	Full Pipe Flow, Q (MGD)
1	Check Full Pipe Flow Velocity, V=(1.486/n)*(Rh)^(0.667)*(S)^(0.5)	0.013	114.308	24.00	93.00	66.05	62.21	0.0413	0.203	0.500	0.630	14.629	3.142	45.958	29.703

		Diameter (inches)	Actual Flow, q (MGD)	q/Q	d/D	Flow Depth, d (in)
2	Partial Pipe Flow Depth	24.00	3.18	0.11	0.22	5.28

		Headwater (feet)	Diameter (feet)	Radius (feet)	Chord (feet)	Interior Angle (degrees)	Arc (feet)	Flow Area (ft^2)	Actual Velocity (fps)	Kinetic Energy (ft)	EGL, down (feet)
3	Pipe Partial Depth Flow Area (Down)	0.4400	2.00	1.00	1.66	111.89	1.95	0.51	9.59	1.43	67.92

		Headwater (feet)	Diameter (feet)	Radius (feet)	Chord (feet)	Interior Angle (degrees)	Arc (feet)	Flow Area (ft^2)	Actual Velocity (fps)	Kinetic Energy (ft)	EGL, up (feet)
4	Pipe Partial Depth Flow Area (Up)	0.4400	2.00	1.00	1.66	111.89	1.95	0.51	9.59	1.43	67.92

E. FROM MANHOLE MH2 TO PLYMOUTH METERING CHAMBER

T/MH 75.76

		n	1.486/n	Diameter (inches)	Length (feet)	Invert Down (feet)	Invert Up (feet)	Slope, S	S^0.50	Hydraulic Radius, Rh	Rh^.667	Velocity, V (fps)	Flow Area, A (ft^2)	Full Pipe Flow, Q (cfs)	Full Pipe Flow, Q (MGD)
1	Check Full Pipe Flow Velocity, V=(1.486/n)*(Rh)^(0.667)*(S)^(0.5)	0.013	114.308	24.00	189.00	66.86	66.05	0.0043	0.065	0.500	0.630	4.713	3.142	14.806	9.569

		Diameter (inches)	Actual Flow, q (MGD)	q/Q	d/D	Flow Depth, d (in)	Flow Depth, d (ft)	EGL (feet)
2	Partial Pipe Flow Depth	24.00	3.18	0.33	0.39	9.36	0.78	67.64

		Headwater (feet)	Diameter (feet)	Radius (feet)	Chord (feet)	Interior Angle (degrees)	Arc (feet)	Flow Area (ft^2)	Actual Velocity (fps)	Kinetic Energy (ft)	EGL, down (feet)
3	Pipe Partial Depth Flow Area (Down)	0.7800	2.00	1.00	1.95	154.58	2.70	1.13	4.33	0.29	67.93

		Headwater (feet)	Diameter (feet)	Radius (feet)	Chord (feet)	Interior Angle (degrees)	Arc (feet)	Flow Area (ft^2)	Actual Velocity (fps)	Kinetic Energy (ft)	EGL, up (feet)
4	Pipe Partial Depth Flow Area (Up)	0.7800	2.00	1.00	1.95	154.58	2.70	1.13	4.33	0.29	67.93

F. FROM PLYMOUTH METERING CHAMBER TO MANHOLE MH_____

T/MH 74.75

	Description	Throat Width, ft.	Constant Power, n	"K" Factor	Flow (MGD)	Flume Level Floor, El. (feet)	Upstream Head, Ha (ft)	Flume Low Point, El. (feet)	Downstream Head, Hb (ft)	Submergence Ratio, Hb/Ha	EGL (feet)
1	Parshall Flume - 9" Throat	0.75	1.530	3.07	3.18	67.20	1.36	66.83	1.07	0.783	68.56

Flume In Submerged Condition
Use Submerged Discharge Table

Exhibit D

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PRESENT MAXIMUM DAILY FLOW = 15.84 MGD (TWO CONSTANT SPEED PLUS TWO VARIABLE SPEED SAWMILL RUN PUMPS)

G. FROM DIVERSION CHAMBER DS-4 TO ENW METERING CHAMBER

T/MH 72.50

	Description	Diameter (inches)	Length (feet)	"C" Factor	"K" Factor	Flow (MGD)	Velocity (fps)	Kinetic Energy (ft)	Minor Head Loss (ft)	Friction Head Loss (ft)	EGL (feet)
											61.40
1	Manhole Entrance (Figure 8-11)	36			1.85	15.84	3.47	0.19	0.35		61.75
2	Ductile Iron Pipe	36	20	100		15.84				0.03	61.78

H. FROM ENW METERING CHAMBER TO TRANSITION PIT

T/MH 73.71

		Width (inches)	Floor, El. (feet)	Depth (feet)	"K" Factor	Flow (MGD)	Velocity (fps)		Minor Head Loss (ft)	Friction Head Loss (ft)	EGL (feet)
											61.78
1	Confusor from Parshall Flume Throat	36	58.21	3.57	0.20	15.84	2.29		0.09		61.87

	Description	Throat Width, ft.	Constant Power, n	"K" Factor	Flow (MGD)	Flume Level Floor, El. (feet)	Upstream Head, Ha (ft)	Flume Low Point, El. (feet)	Downstream Head, Hb (ft)	Submergence Ratio, Hb/Ha	EGL (feet)
2	Parshall Flume - 24" Throat	2.00	1.550	8.00	15.84	58.79	2.06	58.04	3.96	1.921	60.85

Flume In Submerged Condition
Use Submerged Discharge Table

		Width (inches)	Depth (feet)		"K" Factor	Flow (MGD)	Velocity (fps)		Minor Head Loss (ft)	Friction Head Loss (ft)	EGL (feet)
											61.87
3	Difusor into Parshall Flume Throat	24	2.06		0.39	15.84	5.95		0.18		62.06

		Diameter (inches)	Length (feet)	"C" Factor	"K" Factor	Flow (MGD)	Velocity (fps)	Kinetic Energy (ft)	Minor Head Loss (ft)	Friction Head Loss (ft)	EGL (feet)
											62.06
4	Ductile Iron Pipe	36	30	100		15.84				0.05	62.11

I. FROM TRANSITION PIT TO INLET CHAMBER DS-5

T/MH 72.54

	Description	Diameter (inches)	Length (feet)	"C" Factor	"K" Factor	Flow (MGD)	Velocity (fps)	Kinetic Energy (ft)	Minor Head Loss (ft)	Friction Head Loss (ft)	EGL (feet)
											62.11
1	Manhole Loss (@ Transition Pit)	36			0.10	15.84	3.47	0.19	0.02		62.12
2	Ductile Iron Pipe	24	98	100		7.92				0.33	62.45

		Diameter (inches)				Flow (MGD)	Flow (cfs)	Hw/D (from chart)	Headwater (feet)	Pipe Invert	EGL (feet)
4	Headwater Calculation at Pipe Entrance	24				7.92	12.25	0.97	1.94	59.13	61.07

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J. FROM INLET DISTRIBUTION CHAMBER DS-5 TO MANHOLE MH-1A

	Description	Diameter (inches)	Length (feet)	"C" Factor	"K" Factor	Flow (MGD)	Velocity (fps)	Kinetic Energy (ft)	Minor Head Loss (ft)	T/MH Friction Head Loss (ft)	76.08 EGL (feet)
											62.45
1	Manhole Loss @ DS-5 (Figure 8-12)	24			1.30	10.30	5.08	0.40	0.52		62.97
2	Ductile Iron Pipe	24	30	100		10.30				0.16	63.13

K FROM MANHOLE MH-1A TO MANHOLE MH-2B

	Description	Diameter (inches)	Length (feet)	"C" Factor	"K" Factor	Flow (MGD)	Velocity (fps)	Kinetic Energy (ft)	Minor Head Loss (ft)	T/MH Friction Head Loss (ft)	69.86 EGL (feet)
											63.13
1	Manhole Loss @ MH-1A (Fig. 8-15; 90 deg	24			1.04	10.30	5.08	0.40	0.42		63.55
2	Ductile Iron Pipe	24	145	100		10.30				0.79	64.33

L. FROM MANHOLE MH-2B TO MANHOLE MH-3A

	Description	Diameter (inches)	Length (feet)	"C" Factor	"K" Factor	Flow (MGD)	Velocity (fps)	Kinetic Energy (ft)	Minor Head Loss (ft)	T/MH Friction Head Loss (ft)	65.00 EGL (feet)
											64.33
1	Manhole Loss @ 2B (Fig. 8-15; 90 deg)	24			1.04	10.30	5.08	0.40	0.42		64.75
2	Ductile Iron Pipe	24	126	100		10.30				0.68	65.43

M. FROM MANHOLE MH-3A TO MANHOLE MH-4A

	Description	Diameter (inches)	Length (feet)	"C" Factor	"K" Factor	Flow (MGD)	Velocity (fps)	Kinetic Energy (ft)	Minor Head Loss (ft)	T/MH Friction Head Loss (ft)	64.93 EGL (feet)	HGL (feet)	
											65.43		
1	Manhole Loss @ 3A (Fig. 8-15; 65 deg)	24			0.56	10.30	5.08	0.40	0.22		65.66	65.43	Manhole Overflows
2	Ductile Iron Pipe	24	49	100		10.30				0.27	65.92		

N. FROM MANHOLE MH-4A TO MANHOLE MH-5A

	Description	Diameter (inches)	Length (feet)	"C" Factor	"K" Factor	Flow (MGD)	Velocity (fps)	Kinetic Energy (ft)	Minor Head Loss (ft)	T/MH Friction Head Loss (ft)	69.16 EGL (feet)
											65.92
1	Manhole Loss @ 4A (Fig. 8-15; 30 deg)	24			0.16	10.30	5.08	0.40	0.06		65.99
2	Ductile Iron Pipe	24	165	100		10.30				0.89	66.88

O. FROM MANHOLE MH-5A TO MANHOLE MH-6A

	Description	Diameter (inches)	Length (feet)	"C" Factor	"K" Factor	Flow (MGD)	Velocity (fps)	Kinetic Energy (ft)	Minor Head Loss (ft)	T/MH Friction Head Loss (ft)	76.30 EGL (feet)
											66.88
1	Manhole Loss @ 5A (Fig. 8-15; 23 deg)	24			0.10	10.30	5.08	0.40	0.04		66.92
2	Ductile Iron Pipe	24	186	100		10.30				1.01	67.93

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P. FROM MANHOLE MH-6A TO MANHOLE MH-7A

	Description	Diameter (inches)	Length (feet)	"C" Factor	"K" Factor	Flow (MGD)	Velocity (fps)	Kinetic Energy (ft)	Minor Head Loss (ft)	T/MH Friction Head Loss (ft)	82.00 EGL (feet)
											67.93
1	Manhole Loss @ 6A (Fig. 8-15; 14 deg)	24			0.05	10.30	5.08	0.40	0.02		67.95
2	Ductile Iron Pipe	24	152	100		10.30				0.82	68.77

Q. FROM MANHOLE MH-6A TO MANHOLE MH-7A

	Description	Diameter (inches)	Length (feet)	"C" Factor	"K" Factor	Flow (MGD)	Velocity (fps)	Kinetic Energy (ft)	Minor Head Loss (ft)	T/MH Friction Head Loss (ft)	81.00 EGL (feet)
											68.77
1	Manhole Loss @ 7A (Fig. 8-15; 30 deg)	24			0.16	10.30	5.08	0.40	0.06		68.84
2	Ductile Iron Pipe	24	96	100		10.30				0.52	69.36

R. FROM MANHOLE MH-7A TO MANHOLE MH-8A

	Description	Diameter (inches)	Length (feet)	"C" Factor	"K" Factor	Flow (MGD)	Velocity (fps)	Kinetic Energy (ft)	Minor Head Loss (ft)	T/MH Friction Head Loss (ft)	80.20 EGL (feet)
											69.36
1	Manhole Loss @ 8A (Fig. 8-15; 15 deg)	24			0.05	10.30	5.08	0.40	0.02		69.38
2	Ductile Iron Pipe	24	128	100		10.30				0.69	70.07

S. FROM MANHOLE MH-8A TO MANHOLE MH-9A

	Description	Diameter (inches)	Length (feet)	"C" Factor	"K" Factor	Flow (MGD)	Velocity (fps)	Kinetic Energy (ft)	Minor Head Loss (ft)	T/MH Friction Head Loss (ft)	78.73 EGL (feet)
											70.07
1	Manhole Loss @ 9A (Fig. 8-15; 20 deg)	24			0.08	10.30	5.08	0.40	0.03		70.10
2	Ductile Iron Pipe	24	62	100		10.30				0.34	70.44

T. FROM MANHOLE MH-9A TO MANHOLE MH-10

	Description	Diameter (inches)	Length (feet)	"C" Factor	"K" Factor	Flow (MGD)	Velocity (fps)	Kinetic Energy (ft)	Minor Head Loss (ft)	T/MH Friction Head Loss (ft)	78.73 EGL (feet)
											70.44
1	Manhole Loss @ 10 (Fig. 8-15; 37 deg)	24			0.21	10.30	5.08	0.40	0.08		70.52
2	Ductile Iron Pipe	24	26	100		10.30				0.14	70.66

U. FROM MANHOLE MH-10 TO MANHOLE MH-11A

	Description	Diameter (inches)	Length (feet)	"C" Factor	"K" Factor	Flow (MGD)	Velocity (fps)	Kinetic Energy (ft)	Minor Head Loss (ft)	T/MH Friction Head Loss (ft)	79.42 EGL (feet)
											70.66
1	Manhole Loss @ 10 (Fig. 8-15; 80 deg)	24			0.82	10.30	5.08	0.40	0.33		70.99
2	Ductile Iron Pipe	24	15	100		10.30				0.08	71.07

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EAST NORRITON-PLYMOUTH-WHITPAIN JOINT SEWER AUTHORITY
WASTEWATER TREATMENT PLANT

SAWMILL RUN INTERCEPTOR HYDRAULIC ANALYSIS

TWO EXISTING 24" DIAMETER ROSS STREET INTERCEPTOR PIPES
PRESENT MAXIMUM DAILY FLOW = 15.84 MGD (TWO CONSTANT SPEED PLUS TWO VARIABLE SPEED SAWMILL RUN PUMPS)

V. FROM MANHOLE MH-11A TO MANHOLE MH-11

T/MH 79.65

	Description	n	1.486/n	Diameter (inches)	Length (feet)	Invert Down (feet)	Invert Up (feet)	Slope, S	S^0.50	Hydraulic Radius, Rh	Rh^.667	Velocity, V (fps)	Flow Area, A (ft^2)	Full Pipe Flow, Q (cfs)	Full Pipe Flow, Q (MGD)
1	Find Full Pipe Flow														
	Velocity, V=(1.486/n)*(Rh)^(0.667)*(S)^(0.5)	0.013	114.308	24.00	15.00	69.02	69.43	0.0273	0.165	0.500	0.630	11.902	3.142	37.393	24.167

		Diameter (inches)	Actual Flow, q (MGD)	Actual Flow, q (cfs)	q/Q	Theoretical d/D	Flow Depth, d (in)	Flow Depth, d (ft)
2	Find Partial Pipe Flow	24.00	10.300	15.94	0.43	0.45	10.80	0.90

		Diameter (feet)	Radius (feet)	Chord (feet)	Interior Angle (degrees)	Arc (feet)	Flow Area (ft^2)	Actual Flow, q (cfs)	Critical Depth, dc (in)	Critical Depth, dc (feet)	
3	Find Critical Depth	2.00	1.00	1.82	131.59	2.30	2.37	15.94	16.92	1.41	Flow Supercritical

		Flow Depth, d (feet)	Diameter (feet)	Radius (feet)	Chord (feet)	Interior Angle (degrees)	Arc (feet)	Flow Area (ft^2)	Actual Velocity (fps)	Kinetic Energy (ft)	EGL, up (feet)	
	11A-11									d =	71.07	
4	EGL (Up)	0.90	2.00	1.00	1.99	168.52	2.94	1.37	11.62	2.10	73.17	MH Invert Needs Lowered

		"K" Factor	Flow (MGD)	Kinetic Energy (ft)	Minor Head Loss (ft)	EGL (feet)
						73.26
5	Manhole Loss (Fig. 8-15; 20 Deg)	0.18	0.00	0.83	0.15	73.11

		Flow Depth, d (feet)	Diameter (feet)	Radius (feet)	Chord (feet)	Interior Angle (degrees)	Arc (feet)	Flow Area (ft^2)	Actual Velocity (fps)	Kinetic Energy (ft)	EGL, up (feet)
	11-11B									d =	70.33
6	EGL (Down)	0.90	3.00	1.50	2.75	132.84	3.48	1.78	13.74	2.93	73.26

W. FROM INLET DISTRIBUTION CHAMBER DS-5 TO MANHOLE MH-1

T/MH 70.08

	Description	Diameter (inches)	Length (feet)	"C" Factor	"K" Factor	Flow (MGD)	Velocity (fps)	Kinetic Energy (ft)	Minor Head Loss (ft)	Friction Head Loss (ft)	EGL (feet)
											62.45
1	Manhole Loss @ DS-5 (Fig. 8-13)	24			1.12	5.54	2.73	0.12	0.13		62.58
2	Ductile Iron Pipe	24	10	100		5.54				0.02	62.60

X. FROM MANHOLE MH-1 TO MANHOLE MH-2

T/MH 69.86

	Description	Diameter (inches)	Length (feet)	"C" Factor	"K" Factor	Flow (MGD)	Velocity (fps)	Kinetic Energy (ft)	Minor Head Loss (ft)	Friction Head Loss (ft)	EGL (feet)	HGL (feet)	
											62.60		
1	Manhole Loss @ 1 (Fig. 8-15; 90 deg)	24			1.04	5.54	2.73	0.12	0.12		62.72	62.60	OK
2	Ductile Iron Pipe	24	155	100		5.54				0.27	62.99		

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Y. FROM MANHOLE MH-2 TO MANHOLE MH-2A

T/MH 65.00

	Description	Diameter (inches)	Length (feet)	"C" Factor	"K" Factor	Flow (MGD)	Velocity (fps)	Kinetic Energy (ft)	Minor Head Loss (ft)	Friction Head Loss (ft)	EGL (feet)	HGL (feet)	
											62.99		
1	Manhole Loss @ 2 (Fig. 8-15; 90 deg)	24			1.04	5.54	2.73	0.12	0.12		63.11	62.99	OK
2	Ductile Iron Pipe	24	94	100		5.54				0.16	63.27		

Z. FROM MANHOLE MH-2A TO MANHOLE MH-3

T/MH 65.50

	Description	Diameter (inches)	Length (feet)	"C" Factor	"K" Factor	Flow (MGD)	Velocity (fps)	Kinetic Energy (ft)	Minor Head Loss (ft)	Friction Head Loss (ft)	EGL (feet)	HGL (feet)	
											63.27		
1	anhole Loss @ 2A (Fig. 8-15; Straight Thr	24			0.02	5.54	2.73	0.12	0.00		63.27	63.27	OK
2	Ductile Iron Pipe	24	53	100		5.54				0.09	63.36		

AA. FROM MANHOLE MH-3 TO MANHOLE MH-4

T/MH 66.11

	Description	Diameter (inches)	Length (feet)	"C" Factor	"K" Factor	Flow (MGD)	Velocity (fps)	Kinetic Energy (ft)	Minor Head Loss (ft)	Friction Head Loss (ft)	EGL (feet)	HGL (feet)	
											63.36		
1	Manhole Loss @ 3 (Fig. 8-15; 65 deg)	24			0.56	5.54	2.73	0.12	0.06		63.43	63.36	OK

AB. FROM MANHOLE MH-4 TO MANHOLE MH-5

T/MH 68.90

	Description	n	1.486/n	Diameter (inches)	Length (feet)	Invert Down (feet)	Invert Up (feet)	Slope, S	S^0.50	Hydraulic Radius, Rh	Rh^.667	Velocity, v (fps)	Flow Area, A (ft^2)	Full Pipe Flow, Q (cfs)	Full Pipe Flow, Q (MGD)
1	Find Full Pipe Flow Velocity, V=(1.486/n)*(Rh)^(0.667)*(S)^(0.5)	0.013	114.308	24.00	30.00	60.41	61.50	0.0363	0.191	0.500	0.630	13.723	3.142	43.111	27.863

		Diameter (inches)	Actual Flow, q (MGD)	Actual Flow, q (cfs)	q/Q	Theoretical d/D		Flow Depth, d (in)	Flow Depth, d (ft)
2	Find Partial Pipe Flow Depth	24.00	5.539	8.57	0.20	0.31		7.44	0.62

		Diameter (feet)	Radius (feet)	Chord (feet)	Interior Angle (degrees)	Arc (feet)	Flow Area (ft^2)	Actual Flow, q (cfs)	Critical Depth, dc (in)	Critical Depth, dc (feet)
3	Find Critical Depth	2.00	1.00	2.00	177.49	3.10	1.53	8.57	11.74	0.98

Flow Supercritical

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		Flow Depth, d (feet)	Diameter (feet)	Radius (feet)	Chord (feet)	Interior Angle (degrees)	Arc (feet)	Flow Area (ft^2)	Actual Velocity (fps)	Kinetic Energy (ft)	EGL, up (feet)	
	3-4									d =	63.43	
4	EGL (Up)	0.62	2.00	1.00	1.85	135.33	2.36	0.83	10.33	1.66	65.08	OK
					"K" Factor	Flow (MGD)		Kinetic Energy (ft)	Minor Head Loss (ft)		EGL (feet)	
											66.48	
5	Manhole Loss (Fig. 8-15; 23 Deg)				0.10	5.54		0.26	0.03		66.45	
		Flow Depth, d (feet)	Diameter (feet)	Radius (feet)	Chord (feet)	Interior Angle (degrees)	Arc (feet)	Flow Area (ft^2)	Actual Velocity (fps)	Kinetic Energy (ft)	EGL, up (feet)	
	4-5									d =	65.08	
6	EGL (Down)	0.66	2.00	1.00	1.88	140.25	2.45	0.90	9.48	1.40	66.48	

AC. FROM MANHOLE MH-5 TO MANHOLE MH-6

T/MH 75.80

	Description	n	1.486/n	Diameter (inches)	Length (feet)	Invert Down (feet)	Invert Up (feet)	Slope, S	S^0.50	Hydraulic Radius, Rh	Rh^.667	Velocity, V (fps)	Flow Area, A (ft^2)	Full Pipe Flow, Q (cfs)	Full Pipe Flow, Q (MGD)
1	Find Full Pipe Flow Velocity, V=(1.486/n)*(Rh)^(0.667)*(S)^(0.5)	0.013	114.308	24.00	153.00	61.50	65.72	0.0276	0.166	0.500	0.630	11.956	3.142	37.562	24.276

		Diameter (inches)	Actual Flow, q (MGD)	Actual Flow, q (cfs)	q/Q	Theoretical d/D		Flow Depth, d (in)	Flow Depth, d (ft)
2	Find Partial Pipe Flow Depth	24.00	5.539	8.57	0.23	0.33		7.92	0.66

		Diameter (feet)	Radius (feet)	Chord (feet)	Interior Angle (degrees)	Arc (feet)	Flow Area (ft^2)	Actual Flow, q (cfs)	Critical Depth, dc (in)	Critical Depth, dc (feet)
3	Find Critical Depth	2.00	1.00	2.00	177.49	3.10	1.53	8.57	11.74	0.98
										Flow Supercritical

		Flow Depth, d (feet)	Diameter (feet)	Radius (feet)	Chord (feet)	Interior Angle (degrees)	Arc (feet)	Flow Area (ft^2)	Actual Velocity (fps)	Kinetic Energy (ft)	EGL, up (feet)	
	4-5									d =	66.38	
4	EGL (Up)	0.66	2.00	1.00	1.88	140.25	2.45	0.90	9.48	1.40	67.78	MH Invert Needs Lowered
					"K" Factor	Flow (MGD)		Kinetic Energy (ft)	Minor Head Loss (ft)		EGL (feet)	
											67.18	
5	Manhole Loss (Fig. 8-15; 23 Deg)				0.10	5.54		0.96	0.10		67.09	
		Flow Depth, d (feet)	Diameter (feet)	Radius (feet)	Chord (feet)	Interior Angle (degrees)	Arc (feet)	Flow Area (ft^2)	Actual Velocity (fps)	Kinetic Energy (ft)	EGL, up (feet)	
	5-6									d =	66.74	
6	EGL (Down)	1.02	2.00	1.00	2.00	177.71	3.10	1.61	5.33	0.44	67.18	

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AD. FROM MANHOLE MH-5 TO MANHOLE MH-6 — T/MH 82.00

	Description	n	1.486/n	Diameter (inches)	Length (feet)	Invert Down (feet)	Invert Up (feet)	Slope, S	S^0.50	Hydraulic Radius, Rh	Rh^.667	Velocity, V (fps)	Flow Area, A (ft^2)	Full Pipe Flow, Q (cfs)	Full Pipe Flow, Q (MGD)
1	Find Full Pipe Flow Velocity, V=(1.486/n)*(Rh)^(0.667)*(S)^(0.5)	0.013	114.308	24.00	189.00	65.72	66.68	0.0051	0.071	0.500	0.630	5.131	3.142	16.119	10.418

		Diameter (inches)	Actual Flow, q (MGD)	Actual Flow, q (cfs)	q/Q	Theoretical d/D	Flow Depth, d (in)	Flow Depth, d (ft)
2	Find Partial Pipe Flow Depth	24.00	5.539	8.57	0.53	0.51	12.24	1.02

		Diameter (feet)	Radius (feet)	Chord (feet)	Interior Angle (degrees)	Arc (feet)	Flow Area (ft^2)	Actual Flow, q (cfs)	Critical Depth, dc (in)	Critical Depth, dc (feet)
3	Find Critical Depth	2.00	1.00	2.00	177.49	3.10	1.53	8.57	11.74	0.98
										Flow Subcritical

		Flow Depth, d (feet)	Diameter (feet)	Radius (feet)	Chord (feet)	Interior Angle (degrees)	Arc (feet)	Flow Area (ft^2)	Actual Velocity (fps)	Kinetic Energy (ft)	EGL, up (feet)	
	5-6									d =	67.70	
4	EGL (Up)	1.02	2.00	1.00	2.00	177.71	3.10	1.61	5.33	0.44	68.14	OK

		"K" Factor	Flow (MGD)	Kinetic Energy (ft)	Minor Head Loss (ft)	EGL (feet)
						68.14
5	Manhole Loss (Fig. 8-15; 14 Deg)	0.05	5.54	0.02	0.00	68.14

		Flow Depth, d (feet)	Diameter (feet)	Radius (feet)	Chord (feet)	Interior Angle (degrees)	Arc (feet)	Flow Area (ft^2)	Actual Velocity (fps)	Kinetic Energy (ft)	EGL, up (feet)
	6-7									d =	67.68
6	EGL (Down)	1.00	2.00	1.00	2.00	180.00	3.14	1.57	5.46	0.46	68.14

AE. FROM MANHOLE MH-6 TO MANHOLE MH-7 — T/MH 81.00

	Description	n	1.486/n	Diameter (inches)	Length (feet)	Invert Down (feet)	Invert Up (feet)	Slope, S	S^0.50	Hydraulic Radius, Rh	Rh^.667	Velocity, V (fps)	Flow Area, A (ft^2)	Full Pipe Flow, Q (cfs)	Full Pipe Flow, Q (MGD)
1	Find Full Pipe Flow Velocity, V=(1.486/n)*(Rh)^(0.667)*(S)^(0.5)	0.013	114.308	24.00	178.00	66.68	67.72	0.0058	0.076	0.500	0.630	5.503	3.142	17.288	11.173

		Diameter (inches)	Actual Flow, q (MGD)	Actual Flow, q (cfs)	q/Q	Theoretical d/D	Flow Depth, d (in)	Flow Depth, d (ft)
2	Find Partial Pipe Flow Depth	24.00	5.539	8.57	0.50	0.50	12.00	1.00

		Diameter (feet)	Radius (feet)	Chord (feet)	Interior Angle (degrees)	Arc (feet)	Flow Area (ft^2)	Actual Flow, q (cfs)	Critical Depth, dc (in)	Critical Depth, dc (feet)
3	Find Critical Depth	2.00	1.00	2.00	177.49	3.10	1.53	8.57	11.74	0.98
										Flow Subcritical

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		Flow Depth, d (feet)	Diameter (feet)	Radius (feet)	Chord (feet)	Interior Angle (degrees)	Arc (feet)	Flow Area (ft^2)	Actual Velocity (fps)	Kinetic Energy (ft)	EGL, up (feet)	
	6-7									d =	68.72	
4	EGL (Up)	1.00	2.00	1.00	2.00	180.00	3.14	1.57	5.46	0.46	69.18	MH Invert Needs Lowered

		"K" Factor	Flow (MGD)	Kinetic Energy (ft)	Minor Head Loss (ft)	EGL (feet)
						69.18
5	Manhole Loss (Fig. 8-15; 30 Deg)	0.16	5.54	0.02	0.00	69.18

		Flow Depth, d (feet)	Diameter (feet)	Radius (feet)	Chord (feet)	Interior Angle (degrees)	Arc (feet)	Flow Area (ft^2)	Actual Velocity (fps)	Kinetic Energy (ft)	EGL, up (feet)	
	7-8									d =	68.74	
6	EGL (Down)	1.02	2.00	1.00	2.00	177.71	3.10	1.61	5.33	0.44	69.18	

AF. FROM MANHOLE MH-7 TO MANHOLE MH-8

T/MH 80.20

	Description	n	1.486/n	Diameter (inches)	Length (feet)	Invert Down (feet)	Invert Up (feet)	Slope, S	S^0.50	Hydraulic Radius, Rh	Rh^.667	Velocity, V (fps)	Flow Area, A (ft^2)	Full Pipe Flow, Q (cfs)	Full Pipe Flow, Q (MGD)
1	Find Full Pipe Flow Velocity, V=(1.486/n)*(Rh)^(0.667)*(S)^(0.5)	0.013	114.308	24.00	109.00	67.72	68.28	0.0051	0.072	0.500	0.630	5.160	3.142	16.211	10.477

		Diameter (inches)	Actual Flow, q (MGD)	Actual Flow, q (cfs)	q/Q	Theoretical d/D	Flow Depth, d (in)	Flow Depth, d (ft)
2	Find Partial Pipe Flow Depth	24.00	5.539	8.57	0.53	0.51	12.24	1.02

		Diameter (feet)	Radius (feet)	Chord (feet)	Interior Angle (degrees)	Arc (feet)	Flow Area (ft^2)	Actual Flow, q (cfs)	Critical Depth, dc (in)	Critical Depth, dc (feet)	
3	Find Critical Depth	2.00	1.00	2.00	177.49	3.10	1.53	8.57	11.74	0.98	Flow Subcritical

		Flow Depth, d (feet)	Diameter (feet)	Radius (feet)	Chord (feet)	Interior Angle (degrees)	Arc (feet)	Flow Area (ft^2)	Actual Velocity (fps)	Kinetic Energy (ft)	EGL, up (feet)	
	7-8									d =	69.30	
4	EGL (Up)	1.02	2.00	1.00	2.00	177.71	3.10	1.61	5.33	0.44	69.74	MH Invert Needs Lowered

		"K" Factor	Flow (MGD)	Kinetic Energy (ft)	Minor Head Loss (ft)	EGL (feet)
						69.75
5	Manhole Loss (Fig. 8-15; 75 Deg)	0.72	5.54	0.05	0.03	69.71

		Flow Depth, d (feet)	Diameter (feet)	Radius (feet)	Chord (feet)	Interior Angle (degrees)	Arc (feet)	Flow Area (ft^2)	Actual Velocity (fps)	Kinetic Energy (ft)	EGL, up (feet)	
	8-9									d =	69.26	
6	EGL (Down)	0.98	2.00	1.00	2.00	177.71	3.10	1.53	5.60	0.49	69.75	

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AG. FROM MANHOLE MH-8 TO MANHOLE MH-9 — T/MH 78.61

	Description	n	1.486/n	Diameter (inches)	Length (feet)	Invert Down (feet)	Invert Up (feet)	Slope, S	S^0.50	Hydraulic Radius, Rh	Rh^.667	Velocity, V (fps)	Flow Area, A (ft^2)	Full Pipe Flow, Q (cfs)	Full Pipe Flow, Q (MGD)
1	Find Full Pipe Flow Velocity, V=(1.486/n)*(Rh)^(0.667)*(S)^(0.5)	0.013	114.308	24.00	107.00	68.28	68.91	0.0059	0.077	0.500	0.630	5.524	3.142	17.355	11.216

		Diameter (inches)	Actual Flow, q (MGD)	Actual Flow, q (cfs)	q/Q	Theoretical d/D		Flow Depth, d (in)	Flow Depth, d (ft)
2	Find Partial Pipe Flow Depth	24.00	5.539	8.57	0.49	0.49		11.76	0.98

			Diameter (feet)	Radius (feet)	Chord (feet)	Interior Angle (degrees)	Arc (feet)	Flow Area (ft^2)	Actual Flow, q (cfs)	Critical Depth, dc (in)	Critical Depth, dc (feet)
3	Find Critical Depth		2.00	1.00	2.00	177.49	3.10	1.53	8.57	11.74	0.98

Flow Subcritical

		Flow Depth, d (feet)	Diameter (feet)	Radius (feet)	Chord (feet)	Interior Angle (degrees)	Arc (feet)	Flow Area (ft^2)	Actual Velocity (fps)	Kinetic Energy (ft)	EGL, up (feet)	
	8-9									d =	69.89	
4	EGL (Up)	0.98	2.00	1.00	2.00	177.71	3.10	1.53	5.60	0.49	70.38	OK

		"K" Factor	Flow (MGD)		Kinetic Energy (ft)	Minor Head Loss (ft)		EGL (feet)
								70.45
5	Manhole Loss (Fig. 8-15; 75 Deg)	0.72	5.54		0.03	0.02		70.43

		Flow Depth, d (feet)	Diameter (feet)	Radius (feet)	Chord (feet)	Interior Angle (degrees)	Arc (feet)	Flow Area (ft^2)	Actual Velocity (fps)	Kinetic Energy (ft)	EGL, up (feet)
	9-11									d =	69.94
6	EGL (Down)	0.96	2.00	1.00	2.00	175.42	3.06	1.49	5.75	0.51	70.45

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AH. FROM MANHOLE MH-9 TO MANHOLE MH-11

T/MH 79.65

	Description	n	1.486/n	Diameter (inches)	Length (feet)	Invert Down (feet)	Invert Up (feet)	Slope, S	S^0.50	Hydraulic Radius, Rh	Rh^.667	Velocity, V (fps)	Flow Area, A (ft^2)	Full Pipe Flow, Q (cfs)	Full Pipe Flow, Q (MGD)
1	Find Full Pipe Flow Velocity, V=(1.486/n)*(Rh)^(0.667)*(S)^(0.5)	0.013	114.308	24.00	70.00	68.98	69.43	0.0064	0.080	0.500	0.630	5.772	3.142	18.134	11.720

		Diameter (inches)	Actual Flow, q (MGD)	Actual Flow, q (cfs)	q/Q	Theoretical d/D	Flow Depth, d (in)	Flow Depth, d (ft)
2	Find Partial Pipe Flow Depth	24.00	5.539	8.57	0.47	0.48	11.52	0.96

		Diameter (feet)	Radius (feet)	Chord (feet)	Interior Angle (degrees)	Arc (feet)	Flow Area (ft^2)	Actual Flow, q (cfs)	Critical Depth, dc (in)	Critical Depth, dc (feet)
3	Find Critical Depth	2.00	1.00	2.00	177.49	3.10	1.53	8.57	11.74	0.98

Flow Supercritical

		Flow Depth, d (feet)	Diameter (feet)	Radius (feet)	Chord (feet)	Interior Angle (degrees)	Arc (feet)	Flow Area (ft^2)	Actual Velocity (fps)	Kinetic Energy (ft)	EGL, up (feet)
	9-11									d =	70.39
4	EGL (Up)	0.96	2.00	1.00	2.00	175.42	3.06	1.49	5.75	0.51	70.90

MH Invert Needs Lowered

		"K" Factor	Flow (MGD)	Kinetic Energy (ft)	Minor Head Loss (ft)	EGL (feet)
						73.26
5	Manhole Loss (Fig. 8-15; 75 Deg)	1.14	5.54	2.42	2.76	70.50

		Flow Depth, d (feet)	Diameter (feet)	Radius (feet)	Chord (feet)	Interior Angle (degrees)	Arc (feet)	Flow Area (ft^2)	Actual Velocity (fps)	Kinetic Energy (ft)	EGL, up (feet)
	11-11B									d =	70.33
6	EGL (Down)	0.90	3.00	1.50	2.75	132.84	3.48	1.78	13.74	2.93	73.26

AI. FROM MANHOLE MH-11 TO MANHOLE MH-11B

T/MH 84.60

	Description	n	1.486/n	Diameter (inches)	Length (feet)	Invert Down (feet)	Invert Up (feet)	Slope, S	S^0.50	Hydraulic Radius, Rh	Rh^.667	Velocity, V (fps)	Flow Area, A (ft^2)	Full Pipe Flow, Q (cfs)	Full Pipe Flow, Q (MGD)
1	Find Full Pipe Flow Velocity, V=(1.486/n)*(Rh)^(0.667)*(S)^(0.5)	0.013	114.308	36.00	201.00	69.43	76.59	0.0356	0.189	0.750	0.825	17.807	7.069	125.873	81.352

		Diameter (inches)	Actual Flow, q (MGD)	Actual Flow, q (cfs)	q/Q	Theoretical d/D	Flow Depth, d (in)	Flow Depth, d (ft)
2	Find Partial Pipe Flow Depth	36.00	15.839	24.51	0.19	0.30	10.80	0.90

		Diameter (feet)	Radius (feet)	Chord (feet)	Interior Angle (degrees)	Arc (feet)	Flow Area (ft^2)	Actual Flow, q (cfs)	Critical Depth, dc (in)	Critical Depth, dc (feet)
3	Find Critical Depth	3.00	1.50	3.00	179.86	4.71	3.53	24.51	17.98	1.50

Flow Supercritical

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WASTEWATER TREATMENT PLANT

SAWMILL RUN INTERCEPTOR HYDRAULIC ANALYSIS

TWO EXISTING 24" DIAMETER ROSS STREET INTERCEPTOR PIPES
PRESENT MAXIMUM DAILY FLOW = 15.84 MGD (TWO CONSTANT SPEED PLUS TWO VARIABLE SPEED SAWMILL RUN PUMPS)

		Flow Depth, d (feet)	Diameter (feet)	Radius (feet)	Chord (feet)	Interior Angle (degrees)	Arc (feet)	Flow Area (ft^2)	Actual Velocity (fps)	Kinetic Energy (ft)	EGL, up (feet)	
	11-11B									d =	77.49	
4	EGL (Up)	0.90	3.00	1.50	2.75	132.84	3.48	1.78	13.74	2.93	80.42	MH Invert Needs Lowered
					"K" Factor	Flow (MGD)		Kinetic Energy (ft)	Minor Head Loss (ft)		EGL (feet)	
											79.15	
5	Manhole Loss (Fig. 8-15; 75 Deg)				0.72	15.84		1.76	1.27		77.88	
		Flow Depth, d (feet)	Diameter (feet)	Radius (feet)	Chord (feet)	Interior Angle (degrees)	Arc (feet)	Flow Area (ft^2)	Actual Velocity (fps)	Kinetic Energy (ft)	EGL, up (feet)	
	11B-12D									d =	77.97	
6	EGL (Down)	1.26	3.00	1.50	2.96	161.59	4.23	2.82	8.70	1.18	79.15	

AJ. FROM MANHOLE MH-11B TO MANHOLE MH-12D

T/MH 86.60

	Description	n	1.486/n	Diameter (inches)	Length (feet)	Invert Down (feet)	Invert Up (feet)	Slope, S	S^0.50	Hydraulic Radius, Rh	Rh^.667	Velocity, V (fps)	Flow Area, A (ft^2)	Full Pipe Flow, Q (cfs)	Full Pipe Flow, Q (MGD)
1	Check Full Pipe Flow Velocity, V=(1.486/n)*(Rh)^(0.667)*(S)^(0.5)	0.013	114.308	36.00	44.00	76.71	77.12	0.0093	0.097	0.750	0.825	9.108	7.069	64.378	41.608

		Diameter (inches)	Actual Flow, q (MGD)	Actual Flow, q (cfs)	q/Q	Theoretical d/D		Flow Depth, d (in)	Flow Depth, d (ft)
2	Find Partial Pipe Flow Depth	36.00	15.839	24.51	0.38	0.42		15.12	1.26

		Diameter (feet)	Radius (feet)	Chord (feet)	Interior Angle (degrees)	Arc (feet)	Flow Area (ft^2)	Actual Flow, q (cfs)	Critical Depth, dc (in)	Critical Depth, dc (feet)
3	Find Critical Depth	3.00	1.50	3.00	179.86	4.71	3.53	24.51	17.98	1.50
										Flow Supercritical

		Flow Depth, d (feet)	Diameter (feet)	Radius (feet)	Chord (feet)	Interior Angle (degrees)	Arc (feet)	Flow Area (ft^2)	Actual Velocity (fps)	Kinetic Energy (ft)	EGL, up (feet)	
	11B-12D									d =	78.38	
4	EGL (Up)	1.26	3.00	1.50	2.96	161.59	4.23	2.82	8.70	1.18	79.56	MH Invert Needs Lowered
					"K" Factor	Flow (MGD)		Kinetic Energy (ft)	Minor Head Loss (ft)		EGL (feet)	
											79.55	
5	Manhole Loss (Fig. 8-15; 75 Deg)				0.72	15.84		0.25	0.18		79.37	
		Flow Depth, d (feet)	Diameter (feet)	Radius (feet)	Chord (feet)	Interior Angle (degrees)	Arc (feet)	Flow Area (ft^2)	Actual Velocity (fps)	Kinetic Energy (ft)	EGL, up (feet)	
	12D-13									d =	78.62	
6	EGL (Down)	1.38	3.00	1.50	2.99	170.82	4.47	3.17	7.72	0.93	79.55	

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PRESENT MAXIMUM DAILY FLOW = 15.84 MGD (TWO CONSTANT SPEED PLUS TWO VARIABLE SPEED SAWMILL RUN PUMPS)

AK. FROM MANHOLE MH-12D TO MANHOLE MH-13

T/MH 87.03

	Description	n	1.486/n	Diameter (inches)	Length (feet)	Invert Down (feet)	Invert Up (feet)	Slope, S	S^0.50	Hydraulic Radius, Rh	Rh^.667	Velocity, V (fps)	Flow Area, A (ft^2)	Full Pipe Flow, Q (cfs)	Full Pipe Flow, Q (MGD)
1	Check Full Pipe Flow Velocity, V=(1.486/n)*(Rh)^(0.667)*(S)^(0.5)	0.013	114.308	36.00	150.00	77.24	78.30	0.0071	0.084	0.750	0.825	7.931	7.069	56.064	36.234

		Diameter (inches)	Actual Flow, q (MGD)	Actual Flow, q (cfs)	q/Q	Theoretical d/D		Flow Depth, d (in)	Flow Depth, d (ft)
2	Find Partial Pipe Flow Depth	36.00	15.839	24.51	0.44	0.46		16.56	1.38

		Diameter (feet)	Radius (feet)	Chord (feet)	Interior Angle (degrees)	Arc (feet)	Flow Area (ft^2)	Actual Flow, q (cfs)	Critical Depth, dc (in)	Critical Depth, dc (feet)
3	Find Critical Depth	3.00	1.50	3.00	179.86	4.71	3.53	24.51	17.98	1.50
										Flow Supercritical

		Flow Depth, d (feet)	Diameter (feet)	Radius (feet)	Chord (feet)	Interior Angle (degrees)	Arc (feet)	Flow Area (ft^2)	Actual Velocity (fps)	Kinetic Energy (ft)	EGL, up (feet)	
	12D-13									d =	79.68	
4	EGL (Up)	1.38	3.00	1.50	2.99	170.82	4.47	3.17	7.72	0.93	80.61	OK

		"K" Factor	Flow (MGD)	Kinetic Energy (ft)	Minor Head Loss (ft)	EGL (feet)
						80.90
5	Manhole Loss (Fig. 8-15; Straight Thru)	0.02	15.84	0.33	0.01	80.90

		Flow Depth, d (feet)	Diameter (feet)	Radius (feet)	Chord (feet)	Interior Angle (degrees)	Arc (feet)	Flow Area (ft^2)	Actual Velocity (fps)	Kinetic Energy (ft)	EGL, up (feet)
	13-13A									d =	79.65
6	EGL (Down)	1.23	3.00	1.50	2.95	159.26	4.17	2.73	8.98	1.25	80.90

AL. FROM MANHOLE MH-13 TO MANHOLE MH-13A

T/MH 88.30

	Description	n	1.486/n	Diameter (inches)	Length (feet)	Invert Down (feet)	Invert Up (feet)	Slope, S	S^0.50	Hydraulic Radius, Rh	Rh^.667	Velocity, V (fps)	Flow Area, A (ft^2)	Full Pipe Flow, Q (cfs)	Full Pipe Flow, Q (MGD)
1	Check Full Pipe Flow Velocity, V=(1.486/n)*(Rh)^(0.667)*(S)^(0.5)	0.013	114.308	36.00	46.00	78.42	78.94	0.0113	0.106	0.750	0.825	10.031	7.069	70.908	45.828

		Diameter (inches)	Actual Flow, q (MGD)	Actual Flow, q (cfs)	q/Q	Theoretical d/D		Flow Depth, d (in)	Flow Depth, d (ft)
2	Find Partial Pipe Flow Depth	36.00	15.839	24.51	0.35	0.41		14.76	1.23

		Diameter (feet)	Radius (feet)	Chord (feet)	Interior Angle (degrees)	Arc (feet)	Flow Area (ft^2)	Actual Flow, q (cfs)	Critical Depth, dc (in)	Critical Depth, dc (feet)
3	Find Critical Depth	3.00	1.50	3.00	179.86	4.71	3.53	24.51	17.98	1.50
										Flow Supercritical

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		Flow Depth, d (feet)	Diameter (feet)	Radius (feet)	Chord (feet)	Interior Angle (degrees)	Arc (feet)	Flow Area (ft^2)	Actual Velocity (fps)	Kinetic Energy (ft)	EGL, up (feet)	
	13-13A									d =	80.17	
4	EGL (Up)	1.23	3.00	1.50	2.95	159.26	4.17	2.73	8.98	1.25	81.42	MH Invert Needs Lowered

		"K" Factor	Flow (MGD)	Kinetic Energy (ft)	Minor Head Loss (ft)	EGL (feet)
						82.47
5	Manhole Loss (Fig. 8-15; 90 Deg)	1.04	15.84	1.20	1.25	81.22

		Flow Depth, d (feet)	Diameter (feet)	Radius (feet)	Chord (feet)	Interior Angle (degrees)	Arc (feet)	Flow Area (ft^2)	Actual Velocity (fps)	Kinetic Energy (ft)	EGL, up (feet)
	13A-13B									d =	80.02
6	EGL (Down)	0.96	3.00	1.50	2.80	137.80	3.61	1.95	12.57	2.45	82.47

AM. FROM MANHOLE MH-13A TO MANHOLE MH-13B T/MH 96.00

	Description	n	1.486/n	Diameter (inches)	Length (feet)	Invert Down (feet)	Invert Up (feet)	Slope, S	S^0.50	Hydraulic Radius, Rh	Rh^.667	Velocity, V (fps)	Flow Area, A (ft^2)	Full Pipe Flow, Q (cfs)	Full Pipe Flow, Q (MGD)
1	Check Full Pipe Flow Velocity, V=(1.486/n)*(Rh)^(0.667)*(S)^(0.5)	0.013	114.308	36.00	263.00	79.06	86.58	0.0286	0.169	0.750	0.825	15.954	7.069	112.773	72.885

		Diameter (inches)	Actual Flow, q (MGD)	Actual Flow, q (cfs)	q/Q	Theoretical d/D	Flow Depth, d (in)	Flow Depth, d (ft)
2	Find Partial Pipe Flow Depth	36.00	15.839	24.51	0.22	0.32	11.52	0.96

		Diameter (feet)	Radius (feet)	Chord (feet)	Interior Angle (degrees)	Arc (feet)	Flow Area (ft^2)	Actual Flow, q (cfs)	Critical Depth, dc (in)	Critical Depth, dc (feet)	
3	Find Critical Depth	3.00	1.50	3.00	179.86	4.71	3.53	24.51	17.98	1.50	Flow Supercritical

		Flow Depth, d (feet)	Diameter (feet)	Radius (feet)	Chord (feet)	Interior Angle (degrees)	Arc (feet)	Flow Area (ft^2)	Actual Velocity (fps)	Kinetic Energy (ft)	EGL, up (feet)	
	13A-13B									d =	87.54	
4	EGL (Up)	0.96	3.00	1.50	2.80	137.80	3.61	1.95	12.57	2.45	89.99	OK

		"K" Factor	Flow (MGD)	Kinetic Energy (ft)	Minor Head Loss (ft)	EGL (feet)
						90.79
5	Manhole Loss (Fig. 8-15; Straight Thru)	0.02	15.84	0.77	0.02	90.78

		Flow Depth, d (feet)	Diameter (feet)	Radius (feet)	Chord (feet)	Interior Angle (degrees)	Arc (feet)	Flow Area (ft^2)	Actual Velocity (fps)	Kinetic Energy (ft)	EGL, up (feet)
	13B-16A									d =	87.57
6	EGL (Down)	0.87	3.00	1.50	2.72	130.33	3.41	1.70	14.40	3.22	90.79

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PRESENT MAXIMUM DAILY FLOW = 15.84 MGD (TWO CONSTANT SPEED PLUS TWO VARIABLE SPEED SAWMILL RUN PUMPS)

AN. FROM MANHOLE MH-13B TO MANHOLE MH-16A

T/MH 106.50

	Description	n	1.486/n	Diameter (inches)	Length (feet)	Invert Down (feet)	Invert Up (feet)	Slope, S	S^0.50	Hydraulic Radius, Rh	Rh^.667	Velocity, V (fps)	Flow Area, A (ft^2)	Full Pipe Flow, Q (cfs)	Full Pipe Flow, Q (MGD)
1	Check Full Pipe Flow Velocity, V=(1.486/n)*(Rh)^(0.667)*(S)^(0.5)	0.013	114.308	36.00	222.00	86.70	97.44	0.0484	0.220	0.750	0.825	20.752	7.069	146.690	94.805

		Diameter (inches)	Actual Flow, q (MGD)	Actual Flow, q (cfs)	q/Q	Theoretical d/D	Flow Depth, d (in)	Flow Depth, d (ft)
2	Find Partial Pipe Flow Depth	36.00	15.839	24.51	0.17	0.29	10.44	0.87

		Diameter (feet)	Radius (feet)	Chord (feet)	Interior Angle (degrees)	Arc (feet)	Flow Area (ft^2)	Actual Flow, q (cfs)	Critical Depth, dc (in)	Critical Depth, dc (feet)	
3	Find Critical Depth	3.00	1.50	3.00	179.86	4.71	3.53	24.51	17.98	1.50	Flow Supercritical

		Flow Depth, d (feet)	Diameter (feet)	Radius (feet)	Chord (feet)	Interior Angle (degrees)	Arc (feet)	Flow Area (ft^2)	Actual Velocity (fps)	Kinetic Energy (ft)	EGL, up (feet)	
4	13B-16A EGL (Up)	0.87	3.00	1.50	2.72	130.33	3.41	1.70	14.40	d = 3.22	98.31 101.53	MH Invert Needs Lowered

		"K" Factor	Flow (MGD)	Kinetic Energy (ft)	Minor Head Loss (ft)	EGL (feet)	
5	Manhole Loss (Fig. 8-15; 45 Deg)	0.30	15.84	1.15	0.34	100.66 100.31	

		Flow Depth, d (feet)	Diameter (feet)	Radius (feet)	Chord (feet)	Interior Angle (degrees)	Arc (feet)	Flow Area (ft^2)	Actual Velocity (fps)	Kinetic Energy (ft)	EGL, up (feet)	
6	16A-16B EGL (Down)	1.02	3.00	1.50	2.84	142.67	3.74	2.12	11.56	d = 2.08	98.58 100.66	

AO. FROM MANHOLE MH-16A TO MANHOLE MH-16B

T/MH 106.36

	Description	n	1.486/n	Diameter (inches)	Length (feet)	Invert Down (feet)	Invert Up (feet)	Slope, S	S^0.50	Hydraulic Radius, Rh	Rh^.667	Velocity, V (fps)	Flow Area, A (ft^2)	Full Pipe Flow, Q (cfs)	Full Pipe Flow, Q (MGD)
1	Check Full Pipe Flow Velocity, V=(1.486/n)*(Rh)^(0.667)*(S)^(0.5)	0.013	114.308	36.00	18.00	97.56	97.94	0.0211	0.145	0.750	0.825	13.709	7.069	96.901	62.627

		Diameter (inches)	Actual Flow, q (MGD)	Actual Flow, q (cfs)	q/Q	Theoretical d/D	Flow Depth, d (in)	Flow Depth, d (ft)
2	Find Partial Pipe Flow Depth	36.00	15.839	24.51	0.25	0.34	12.24	1.02

		Diameter (feet)	Radius (feet)	Chord (feet)	Interior Angle (degrees)	Arc (feet)	Flow Area (ft^2)	Actual Flow, q (cfs)	Critical Depth, dc (in)	Critical Depth, dc (feet)	
3	Find Critical Depth	3.00	1.50	3.00	179.86	4.71	3.53	24.51	17.98	1.50	Flow Supercritical

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		Flow Depth, d (feet)	Diameter (feet)	Radius (feet)	Chord (feet)	Interior Angle (degrees)	Arc (feet)	Flow Area (ft^2)	Actual Velocity (fps)	Kinetic Energy (ft)	EGL, up (feet)	
	16A-16B									d =	98.96	
4	EGL (Up)	1.02	3.00	1.50	2.84	142.67	3.74	2.12	11.56	2.08	101.04	OK
					"K" Factor	Flow (MGD)		Kinetic Energy (ft)	Minor Head Loss (ft)		EGL (feet)	
											101.67	
5	Manhole Loss (Fig. 8-15; 45 Deg)				0.30	15.84		0.60	0.18		101.49	
		Flow Depth, d (feet)	Diameter (feet)	Radius (feet)	Chord (feet)	Interior Angle (degrees)	Arc (feet)	Flow Area (ft^2)	Actual Velocity (fps)	Kinetic Energy (ft)	EGL, up (feet)	
	16B-18									d =	98.99	
6	EGL (Down)	0.93	3.00	1.50	2.77	135.33	3.54	1.87	13.13	2.68	101.67	

AP. FROM MANHOLE MH-16B TO MANHOLE MH-18 T/MH 117.60

	Description	n	1.486/n	Diameter (inches)	Length (feet)	Invert Down (feet)	Invert Up (feet)	Slope, S	S^0.50	Hydraulic Radius, Rh	Rh^.667	Velocity, v (fps)	Flow Area, A (ft^2)	Full Pipe Flow, Q (cfs)	Full Pipe Flow, Q (MGD)
1	Check Full Pipe Flow														
	Velocity, V=(1.486/n)*(Rh)^(0.667)*(S)^(0.5)	0.013	114.308	36.00	388.00	98.06	109.69	0.0300	0.173	0.750	0.825	16.335	7.069	115.464	74.625

		Diameter (inches)	Actual Flow, q (MGD)	Actual Flow, q (cfs)	q/Q	Theoretical d/D		Flow Depth, d (in)	Flow Depth, d (ft)
2	Find Partial Pipe Flow	36.00	15.839	24.51	0.21	0.31		11.16	0.93

		Diameter (feet)	Radius (feet)	Chord (feet)	Interior Angle (degrees)	Arc (feet)	Flow Area (ft^2)	Actual Flow, q (cfs)	Critical Depth, dc (in)	Critical Depth, dc (feet)	
3	Find Critical Depth	3.00	1.50	3.00	179.86	4.71	3.53	24.51	17.98	1.50	Flow Supercritical
		Flow Depth, d (feet)	Diameter (feet)	Radius (feet)	Chord (feet)	Interior Angle (degrees)	Arc (feet)	Flow Area (ft^2)	Actual Velocity (fps)	Kinetic Energy (ft)	EGL, up (feet)	
	16B-18									d =	110.62	
4	EGL (Up)	0.93	3.00	1.50	2.77	135.33	3.54	1.87	13.13	2.68	113.30	MH Invert Needs Lowered
					"K" Factor	Flow (MGD)		Kinetic Energy (ft)	Minor Head Loss (ft)		EGL (feet)	
											112.14	
5	Manhole Loss (Fig. 8-15; Straight Thru)				0.02	15.84		1.70	0.03		112.11	
		Flow Depth, d (feet)	Diameter (feet)	Radius (feet)	Chord (feet)	Interior Angle (degrees)	Arc (feet)	Flow Area (ft^2)	Actual Velocity (fps)	Kinetic Energy (ft)	EGL, up (feet)	
	18-19									d =	111.16	
6	EGL (Down)	1.35	3.00	1.50	2.98	168.52	4.41	3.08	7.94	0.98	112.14	

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AQ. FROM MANHOLE MH-18 TO MANHOLE MH-19 — T/MH 126.59

	Description	n	1.486/n	Diameter (inches)	Length (feet)	Invert Down (feet)	Invert Up (feet)	Slope, S	S^0.50	Hydraulic Radius, Rh	Rh^.667	Velocity, V (fps)	Flow Area, A (ft^2)	Full Pipe Flow, Q (cfs)	Full Pipe Flow, Q (MGD)
1	Check Full Pipe Flow Velocity, V=(1.486/n)*(Rh)^(0.667)*(S)^(0.5)	0.013	114.308	36.00	310.00	109.81	112.19	0.0077	0.088	0.750	0.825	8.267	7.069	58.436	37.767

		Diameter (inches)	Actual Flow, q (MGD)	Actual Flow, q (cfs)	q/Q	Theoretical d/D	Flow Depth, d (in)	Flow Depth, d (ft)
2	Find Partial Pipe Flow Depth	36.00	15.839	24.51	0.42	0.45	16.20	1.35

		Diameter (feet)	Radius (feet)	Chord (feet)	Interior Angle (degrees)	Arc (feet)	Flow Area (ft^2)	Actual Flow, q (cfs)	Critical Depth, dc (in)	Critical Depth, dc (feet)
3	Find Critical Depth	3.00	1.50	3.00	179.86	4.71	3.53	24.51	17.98	1.50

Flow Supercritical

		Flow Depth, d (feet)	Diameter (feet)	Radius (feet)	Chord (feet)	Interior Angle (degrees)	Arc (feet)	Flow Area (ft^2)	Actual Velocity (fps)	Kinetic Energy (ft)	EGL, up (feet)	
	18-19									d =	113.54	
4	EGL (Up)	1.35	3.00	1.50	2.98	168.52	4.41	3.08	7.94	0.98	114.52	OK

		"K" Factor	Flow (MGD)	Kinetic Energy (ft)	Minor Head Loss (ft)	EGL (feet)
						114.87
5	Manhole Loss (Fig. 8-15; Straight Thru)	0.02	15.84	0.70	0.01	114.86

		Flow Depth, d (feet)	Diameter (feet)	Radius (feet)	Chord (feet)	Interior Angle (degrees)	Arc (feet)	Flow Area (ft^2)	Actual Velocity (fps)	Kinetic Energy (ft)	EGL, up (feet)
	19-20(Drop Manhole)									d =	114.59
6	EGL (Down)	2.28	3.00	1.50	2.56	117.34	3.07	5.76	4.25	0.28	114.87

AW. FROM MANHOLE MH-19 TO MANHOLE MH-20 (Drop Manhole) — T/MH 128.55

	Description	n	1.486/n	Diameter (inches)	Length (feet)	Invert Down (feet)	Invert Up (feet)	Slope, S	S^0.50	Hydraulic Radius, Rh	Rh^.667	Velocity, V (fps)	Flow Area, A (ft^2)	Full Pipe Flow, Q (cfs)	Full Pipe Flow, Q (MGD)
1	Check Full Pipe Flow Velocity, V=(1.486/n)*(Rh)^(0.667)*(S)^(0.5)	0.013	114.308	36.00	35.00	112.31	112.36	0.0015	0.039	0.750	0.825	3.682	7.069	26.029	16.823

		Diameter (inches)	Actual Flow, q (MGD)	Actual Flow, q (cfs)	q/Q	Theoretical d/D	Flow Depth, d (in)	Flow Depth, d (ft)
2	Find Partial Pipe Flow Depth	36.00	15.839	24.51	0.94	0.76	27.36	2.28

		Diameter (feet)	Radius (feet)	Chord (feet)	Interior Angle (degrees)	Arc (feet)	Flow Area (ft^2)	Actual Flow, q (cfs)	Critical Depth, dc (in)	Critical Depth, dc (feet)
3	Find Critical Depth	3.00	1.50	2.99	170.14	4.45	3.92	28.37	19.55	1.63

Flow Subcritical

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PRESENT MAXIMUM DAILY FLOW = 15.84 MGD (TWO CONSTANT SPEED PLUS TWO VARIABLE SPEED SAWMILL RUN PUMPS)

		Flow Depth, d (feet)	Diameter (feet)	Radius (feet)	Chord (feet)	Interior Angle (degrees)	Arc (feet)	Flow Area (ft^2)	Actual Velocity (fps)	Kinetic Energy (ft)	EGL, up (feet)	
	19-20(Drop Manhole)									d =	114.64	
4	EGL (Up)	2.28	3.00	1.50	2.56	117.34	3.07	5.76	4.25	0.28	114.92	OK
					"K" Factor	Flow (MGD)		Kinetic Energy (ft)	Minor Head Loss (ft)		EGL (feet)	
											125.14	
5	Manhole Loss (Fig. 8-15; Drop Manhole)				1.00	15.84		5.27	5.27		119.87	
		Flow Depth, d (feet)	Diameter (feet)	Radius (feet)	Chord (feet)	Interior Angle (degrees)	Arc (feet)	Flow Area (ft^2)	Actual Velocity (fps)	Kinetic Energy (ft)	EGL, up (feet)	
	20 (Drop Manhole)-21									d =	119.59	
6	EGL (Down)	0.78	2.50	1.25	2.31	135.33	2.95	1.30	18.91	5.55	125.14	

AX. FROM MANHOLE MH-20 (Drop Manhole) TO MANHOLE MH-21 T/MH 151.88

	Description	n	1.486/n	Diameter (inches)	Length (feet)	Invert Down (feet)	Invert Up (feet)	Slope, S	S^0.50	Hydraulic Radius, Rh	Rh^.667	Velocity, V (fps)	Flow Area, A (ft^2)	Full Pipe Flow, Q (cfs)	Full Pipe Flow, Q (MGD)
1	Check Full Pipe Flow Velocity, V=(1.486/n)*(Rh)^(0.667)*(S)^(0.5)	0.013	114.308	30.00	305.00	118.81	142.44	0.0775	0.278	0.625	0.731	23.255	4.909	114.151	73.776
				Diameter (inches)	Actual Flow, q (MGD)	Actual Flow, q (cfs)	q/Q	Theoretical d/D		Flow Depth, d (in)	Flow Depth, d (ft)				
2	Find Partial Pipe Flow Depth			30.00	15.839	24.51	0.21	0.31		9.30	0.78				
			Diameter (feet)	Radius (feet)	Chord (feet)	Interior Angle (degrees)	Arc (feet)	Flow Area (ft^2)	Actual Flow, q (cfs)	Critical Depth, dc (in)	Critical Depth, dc (feet)				
3	Find Critical Depth		2.50	1.25	2.38	144.71	3.16	3.38	24.51	19.55	1.63				
											Flow Supercritical				
		Flow Depth, d (feet)	Diameter (feet)	Radius (feet)	Chord (feet)	Interior Angle (degrees)	Arc (feet)	Flow Area (ft^2)	Actual Velocity (fps)	Kinetic Energy (ft)	EGL, up (feet)				
	20 (Drop Manhole)-21									d =	143.22				
4	EGL (Up)	0.78	2.50	1.25	2.31	135.33	2.95	1.30	18.91	5.55	148.77	OK			
					"K" Factor	Flow (MGD)		Kinetic Energy (ft)	Minor Head Loss (ft)		EGL (feet)				
											149.39				
5	Manhole Loss (Fig. 8-15; Straight Thru)				0.02	15.84		0.53	0.01		149.38				
		Flow Depth, d (feet)	Diameter (feet)	Radius (feet)	Chord (feet)	Interior Angle (degrees)	Arc (feet)	Flow Area (ft^2)	Actual Velocity (fps)	Kinetic Energy (ft)	EGL, up (feet)				
	21-21A									d =	143.31				
6	EGL (Down)	0.75	2.50	1.25	2.29	132.84	2.90	1.24	19.79	6.08	149.39				

Exhibit D

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AY. FROM MANHOLE MH-21 TO MANHOLE MH-21A

T/MH 156.52

	Description	n	1.486/n	Diameter (inches)	Length (feet)	Invert Down (feet)	Invert Up (feet)	Slope, S	S^0.50	Hydraulic Radius, Rh	Rh^.667	Velocity, V (fps)	Flow Area, A (ft^2)	Full Pipe Flow, Q (cfs)	Full Pipe Flow, Q (MGD)
1	Check Full Pipe Flow Velocity, V=(1.486/n)*(Rh)^(0.667)*(S)^(0.5)	0.013	114.308	30.00	57.00	142.56	148.44	0.1032	0.321	0.625	0.731	26.834	4.909	131.719	85.130

		Diameter (inches)	Actual Flow, q (MGD)	Actual Flow, q (cfs)	q/Q	Theoretical d/D	Flow Depth, d (in)	Flow Depth, d (ft)
2	Find Partial Pipe Flow Depth	30.00	15.839	24.51	0.19	0.30	9.00	0.75

		Diameter (feet)	Radius (feet)	Chord (feet)	Interior Angle (degrees)	Arc (feet)	Flow Area (ft^2)	Actual Flow, q (cfs)	Critical Depth, dc (in)	Critical Depth, dc (feet)
3	Find Critical Depth	2.50	1.25	2.38	144.71	3.16	3.38	24.51	19.55	1.63
										Flow Supercritical

		Flow Depth, d (feet)	Diameter (feet)	Radius (feet)	Chord (feet)	Interior Angle (degrees)	Arc (feet)	Flow Area (ft^2)	Actual Velocity (fps)	Kinetic Energy (ft)	EGL, up (feet)	
	21-21A									d =	149.19	
4	EGL (Up)	0.75	2.50	1.25	2.29	132.84	2.90	1.24	19.79	6.08	155.27	MH Invert Needs Lowered

		"K" Factor	Flow (MGD)	Kinetic Energy (ft)	Minor Head Loss (ft)	EGL (feet)
						154.45
5	Manhole Loss (Fig. 8-15; Straight Thru)	0.02	15.84	0.99	0.02	154.43

		Flow Depth, d (feet)	Diameter (feet)	Radius (feet)	Chord (feet)	Interior Angle (degrees)	Arc (feet)	Flow Area (ft^2)	Actual Velocity (fps)	Kinetic Energy (ft)	EGL, up (feet)
	21A-22A									d =	149.36
6	EGL (Down)	0.80	2.50	1.25	2.33	137.80	3.01	1.35	18.10	5.09	154.45

AZ. FROM MANHOLE MH-21A TO MANHOLE MH-22A

T/MH 179.33

	Description	n	1.486/n	Diameter (inches)	Length (feet)	Invert Down (feet)	Invert Up (feet)	Slope, S	S^0.50	Hydraulic Radius, Rh	Rh^.667	Velocity, V (fps)	Flow Area, A (ft^2)	Full Pipe Flow, Q (cfs)	Full Pipe Flow, Q (MGD)
1	Check Full Pipe Flow Velocity, V=(1.486/n)*(Rh)^(0.667)*(S)^(0.5)	0.013	114.308	30.00	276.00	148.56	168.44	0.0720	0.268	0.625	0.731	22.422	4.909	110.065	71.135

		Diameter (inches)	Actual Flow, q (MGD)	Actual Flow, q (cfs)	q/Q	Theoretical d/D	Flow Depth, d (in)	Flow Depth, d (ft)
2	Find Partial Pipe Flow Depth	30.00	15.839	24.51	0.22	0.32	9.60	0.80

		Diameter (feet)	Radius (feet)	Chord (feet)	Interior Angle (degrees)	Arc (feet)	Flow Area (ft^2)	Actual Flow, q (cfs)	Critical Depth, dc (in)	Critical Depth, dc (feet)
3	Find Critical Depth	2.50	1.25	2.38	144.71	3.16	3.38	24.51	19.55	1.63
										Flow Supercritical

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		Flow Depth, d (feet)	Diameter (feet)	Radius (feet)	Chord (feet)	Interior Angle (degrees)	Arc (feet)	Flow Area (ft^2)	Actual Velocity (fps)	Kinetic Energy (ft)	EGL, up (feet)	
	21A-22A									d =	169.24	
4	EGL (Up)	0.80	2.50	1.25	2.33	137.80	3.01	1.35	18.10	5.09	174.33	OK
					"K" Factor	Flow (MGD)		Kinetic Energy (ft)	Minor Head Loss (ft)		EGL (feet)	
											174.89	
5	Manhole Loss (Fig. 8-15; 22.5 Deg)				0.10	15.84		0.47	0.05		174.84	
		Flow Depth, d (feet)	Diameter (feet)	Radius (feet)	Chord (feet)	Interior Angle (degrees)	Arc (feet)	Flow Area (ft^2)	Actual Velocity (fps)	Kinetic Energy (ft)	EGL, up (feet)	
	22A-23A									d =	169.34	
6	EGL (Down)	0.78	2.50	1.25	2.31	135.33	2.95	1.30	18.91	5.55	174.89	

BA. FROM MANHOLE MH-22A TO MANHOLE MH-23A — T/MH 181.28

	Description	n	1.486/n	Diameter (inches)	Length (feet)	Invert Down (feet)	Invert Up (feet)	Slope, S	S^0.50	Hydraulic Radius, Rh	Rh^.667	Velocity, V (fps)	Flow Area, A (ft^2)	Full Pipe Flow, Q (cfs)	Full Pipe Flow, Q (MGD)
1	Check Full Pipe Flow Velocity, V=(1.486/n)*(Rh)^(0.667)*(S)^(0.5)	0.013	114.308	30.00	38.00	168.56	171.96	0.0895	0.299	0.625	0.731	24.991	4.909	122.672	79.283

		Diameter (inches)	Actual Flow, q (MGD)	Actual Flow, q (cfs)	q/Q	Theoretical d/D		Flow Depth, d (in)	Flow Depth, d (ft)
2	Find Partial Pipe Flow Depth	30.00	15.839	24.51	0.20	0.31		9.30	0.78

		Diameter (feet)	Radius (feet)	Chord (feet)	Interior Angle (degrees)	Arc (feet)	Flow Area (ft^2)	Actual Flow, q (cfs)	Critical Depth, dc (in)	Critical Depth, dc (feet)
3	Find Critical Depth	2.50	1.25	2.38	144.71	3.16	3.38	24.51	19.55	1.63
										Flow Supercritical

		Flow Depth, d (feet)	Diameter (feet)	Radius (feet)	Chord (feet)	Interior Angle (degrees)	Arc (feet)	Flow Area (ft^2)	Actual Velocity (fps)	Kinetic Energy (ft)	EGL, up (feet)	
	22A-23A									d =	172.74	
4	EGL (Up)	0.78	2.50	1.25	2.31	135.33	2.95	1.30	18.91	5.55	178.29	OK
					"K" Factor	Flow (MGD)		Kinetic Energy (ft)	Minor Head Loss (ft)		EGL (feet)	
											178.41	
5	Manhole Loss (Fig. 8-15; 22.5 Deg)				0.10	15.84		0.00	0.00		178.41	
		Flow Depth, d (feet)	Diameter (feet)	Radius (feet)	Chord (feet)	Interior Angle (degrees)	Arc (feet)	Flow Area (ft^2)	Actual Velocity (fps)	Kinetic Energy (ft)	EGL, up (feet)	
	23A-23									d =	172.86	
6	EGL (Down)	0.78	2.50	1.25	2.31	135.33	2.95	1.30	18.91	5.55	178.41	

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BB. FROM MANHOLE MH-23A TO MANHOLE MH-23

T/MH 183.30

	Description	n	1.486/n	Diameter (inches)	Length (feet)	Invert Down (feet)	Invert Up (feet)	Slope, S	S^0.50	Hydraulic Radius, Rh	Rh^.667	Velocity, V (fps)	Flow Area, A (ft^2)	Full Pipe Flow, Q (cfs)	Full Pipe Flow, Q (MGD)
1	Check Full Pipe Flow Velocity, V=(1.486/n)*(Rh)^(0.667)*(S)^(0.5)	0.013	114.308	30.00	21.00	172.08	173.94	0.0886	0.298	0.625	0.731	24.864	4.909	122.052	78.882

		Diameter (inches)	Actual Flow, q (MGD)	Actual Flow, q (cfs)	q/Q	Theoretical d/D	Flow Depth, d (in)	Flow Depth, d (ft)
2	Find Partial Pipe Flow Depth	30.00	15.839	24.51	0.20	0.31	9.30	0.78

		Diameter (feet)	Radius (feet)	Chord (feet)	Interior Angle (degrees)	Arc (feet)	Flow Area (ft^2)	Actual Flow, q (cfs)	Critical Depth, dc (in)	Critical Depth, dc (feet)
3	Find Critical Depth	2.50	1.25	2.38	144.71	3.16	3.38	24.51	19.55	1.63

Flow Supercritical

		Flow Depth, d (feet)	Diameter (feet)	Radius (feet)	Chord (feet)	Interior Angle (degrees)	Arc (feet)	Flow Area (ft^2)	Actual Velocity (fps)	Kinetic Energy (ft)	EGL, up (feet)	
	23A-23									d =	174.72	
4	EGL (Up)	0.78	2.50	1.25	2.31	135.33	2.95	1.30	18.91	5.55	180.27	OK

		"K" Factor	Flow (MGD)	Kinetic Energy (ft)	Minor Head Loss (ft)	EGL (feet)
						180.89
5	Manhole Loss (Fig. 8-15; Straight Thru)	0.02	15.84	0.53	0.01	180.88

		Flow Depth, d (feet)	Diameter (feet)	Radius (feet)	Chord (feet)	Interior Angle (degrees)	Arc (feet)	Flow Area (ft^2)	Actual Velocity (fps)	Kinetic Energy (ft)	EGL, up (feet)
	23-24									d =	174.81
6	EGL (Down)	0.75	2.50	1.25	2.29	132.84	2.90	1.24	19.79	6.08	180.89

BC. FROM MANHOLE MH-23 TO MANHOLE MH-24

T/MH 195.23

	Description	n	1.486/n	Diameter (inches)	Length (feet)	Invert Down (feet)	Invert Up (feet)	Slope, S	S^0.50	Hydraulic Radius, Rh	Rh^.667	Velocity, V (fps)	Flow Area, A (ft^2)	Full Pipe Flow, Q (cfs)	Full Pipe Flow, Q (MGD)
1	Check Full Pipe Flow Velocity, V=(1.486/n)*(Rh)^(0.667)*(S)^(0.5)	0.013	114.308	30.00	128.00	174.06	186.94	0.1006	0.317	0.625	0.731	26.502	4.909	130.092	84.078

		Diameter (inches)	Actual Flow, q (MGD)	Actual Flow, q (cfs)	q/Q	Theoretical d/D	Flow Depth, d (in)	Flow Depth, d (ft)
2	Find Partial Pipe Flow Depth	30.00	15.839	24.51	0.19	0.30	9.00	0.75

		Diameter (feet)	Radius (feet)	Chord (feet)	Interior Angle (degrees)	Arc (feet)	Flow Area (ft^2)	Actual Flow, q (cfs)	Critical Depth, dc (in)	Critical Depth, dc (feet)
3	Find Critical Depth	2.50	1.25	2.38	144.71	3.16	3.38	24.51	19.55	1.63

Flow Supercritical

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		Flow Depth, d (feet)	Diameter (feet)	Radius (feet)	Chord (feet)	Interior Angle (degrees)	Arc (feet)	Flow Area (ft^2)	Actual Velocity (fps)	Kinetic Energy (ft)	EGL, up (feet)	
	23-24									d =	187.69	
4	EGL (Up)	0.75	2.50	1.25	2.29	132.84	2.90	1.24	19.79	6.08	193.77	OK
					"K" Factor	Flow (MGD)		Kinetic Energy (ft)	Minor Head Loss (ft)		EGL (feet)	
5	Manhole Loss (Fig. 8-15; Straight Thru)				0.02	15.84		0.60	0.01		194.47	
											194.45	
		Flow Depth, d (feet)	Diameter (feet)	Radius (feet)	Chord (feet)	Interior Angle (degrees)	Arc (feet)	Flow Area (ft^2)	Actual Velocity (fps)	Kinetic Energy (ft)	EGL, up (feet)	
	24-24A									d =	187.79	
6	EGL (Down)	0.73	2.50	1.25	2.27	130.33	2.84	1.18	20.74	6.68	194.47	

BD. FROM MANHOLE MH-24 TO MANHOLE MH-24A T/MH 205.80

	Description	n	1.486/n	Diameter (inches)	Length (feet)	Invert Down (feet)	Invert Up (feet)	Slope, S	S^0.50	Hydraulic Radius, Rh	Rh^.667	Velocity, V (fps)	Flow Area, A (ft^2)	Full Pipe Flow, Q (cfs)	Full Pipe Flow, Q (MGD)
1	Check Full Pipe Flow														
	Velocity, V=(1.486/n)*(Rh)^(0.667)*(S)^(0.5)	0.013	114.308	30.00	102.00	187.06	197.81	0.1054	0.325	0.625	0.731	27.123	4.909	133.138	86.047

		Diameter (inches)	Actual Flow, q (MGD)	Actual Flow, q (cfs)	q/Q	Theoretical d/D		Flow Depth, d (in)	Flow Depth, d (ft)
2	Find Partial Pipe Flow Depth	30.00	15.839	24.51	0.18	0.29		8.70	0.73

		Diameter (feet)	Radius (feet)	Chord (feet)	Interior Angle (degrees)	Arc (feet)	Flow Area (ft^2)	Actual Flow, q (cfs)	Critical Depth, dc (in)	Critical Depth, dc (feet)
3	Find Critical Depth	2.50	1.25	2.38	144.71	3.16	3.38	24.51	19.55	1.63
										Flow Supercritical

		Flow Depth, d (feet)	Diameter (feet)	Radius (feet)	Chord (feet)	Interior Angle (degrees)	Arc (feet)	Flow Area (ft^2)	Actual Velocity (fps)	Kinetic Energy (ft)	EGL, up (feet)	
	24-24A									d =	198.54	
4	EGL (Up)	0.73	2.50	1.25	2.27	130.33	2.84	1.18	20.74	6.68	205.22	MH Invert Needs Lowered
					"K" Factor	Flow (MGD)		Kinetic Energy (ft)	Minor Head Loss (ft)		EGL (feet)	
5	Manhole Loss (Fig. 8-15; 22.5 Deg)				0.10	15.84		0.60	0.06		204.76	
											204.70	
		Flow Depth, d (feet)	Diameter (feet)	Radius (feet)	Chord (feet)	Interior Angle (degrees)	Arc (feet)	Flow Area (ft^2)	Actual Velocity (fps)	Kinetic Energy (ft)	EGL, up (feet)	
	24A-24B									d =	198.68	
6	EGL (Down)	0.75	2.50	1.25	2.29	132.84	2.90	1.24	19.79	6.08	204.76	

Exhibit D

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EAST NORRITON-PLYMOUTH-WHITPAIN JOINT SEWER AUTHORITY
WASTEWATER TREATMENT PLANT

SAWMILL RUN INTERCEPTOR HYDRAULIC ANALYSIS

TWO EXISTING 24" DIAMETER ROSS STREET INTERCEPTOR PIPES
PRESENT MAXIMUM DAILY FLOW = 15.84 MGD (TWO CONSTANT SPEED PLUS TWO VARIABLE SPEED SAWMILL RUN PUMPS)

BE. FROM MANHOLE MH-24A TO MANHOLE MH-24B

T/MH 209.81

		n	1.486/n	Diameter (inches)	Length (feet)	Invert Down (feet)	Invert Up (feet)	Slope, S	S^0.50	Hydraulic Radius, Rh	Rh^.667	Velocity, V (fps)	Flow Area, A (ft^2)	Full Pipe Flow, Q (cfs)	Full Pipe Flow, Q (MGD)
1	Check Full Pipe Flow Velocity, V=(1.486/n)*(Rh)^(0.667)*(S)^(0.5)	0.013	114.308	30.00	39.00	197.93	201.94	0.1028	0.321	0.625	0.731	26.790	4.909	131.503	84.991

		Diameter (inches)	Actual Flow, q (MGD)	Actual Flow, q (cfs)	q/Q	Theoretical d/D	Flow Depth, d (in)	Flow Depth, d (ft)
2	Find Partial Pipe Flow Depth	30.00	15.839	24.51	0.19	0.30	9.00	0.75

		Diameter (feet)	Radius (feet)	Chord (feet)	Interior Angle (degrees)	Arc (feet)	Flow Area (ft^2)	Actual Flow, q (cfs)	Critical Depth, dc (in)	Critical Depth, dc (feet)	
3	Find Critical Depth	2.50	1.25	2.38	144.71	3.16	3.38	24.51	19.55	1.63	Flow Supercritical

		Flow Depth, d (feet)	Diameter (feet)	Radius (feet)	Chord (feet)	Interior Angle (degrees)	Arc (feet)	Flow Area (ft^2)	Actual Velocity (fps)	Kinetic Energy (ft)	EGL, up (feet)	
	24A-24B									d =	202.69	
4	EGL (Up)	0.75	2.50	1.25	2.29	132.84	2.90	1.24	19.79	6.08	208.77	MH Invert Needs Lowered

		"K" Factor	Flow (MGD)	Kinetic Energy (ft)	Minor Head Loss (ft)	-	EGL (feet)
							208.39
5	Manhole Loss (Fig. 8-15; 22.5 Deg)	0.10	15.84	0.53	0.05		208.33

		Flow Depth, d (feet)	Diameter (feet)	Radius (feet)	Chord (feet)	Interior Angle (degrees)	Arc (feet)	Flow Area (ft^2)	Actual Velocity (fps)	Kinetic Energy (ft)	EGL, up (feet)
	24B-25									d =	202.84
6	EGL (Down)	0.78	2.50	1.25	2.31	135.33	2.95	1.30	18.91	5.55	208.39

BF. FROM MANHOLE MH-24B TO MANHOLE MH-25

T/MH 226.70

		n	1.486/n	Diameter (inches)	Length (feet)	Invert Down (feet)	Invert Up (feet)	Slope, S	S^0.50	Hydraulic Radius, Rh	Rh^.667	Velocity, V (fps)	Flow Area, A (ft^2)	Full Pipe Flow, Q (cfs)	Full Pipe Flow, Q (MGD)
1	Check Full Pipe Flow Velocity, V=(1.486/n)*(Rh)^(0.667)*(S)^(0.5)	0.013	114.308	30.00	180.00	202.06	217.25	0.0844	0.290	0.625	0.731	24.270	4.909	119.135	76.997

		Diameter (inches)	Actual Flow, q (MGD)	Actual Flow, q (cfs)	q/Q	Theoretical d/D	Flow Depth, d (in)	Flow Depth, d (ft)
2	Find Partial Pipe Flow Depth	30.00	15.839	24.51	0.21	0.31	9.30	0.78

		Diameter (feet)	Radius (feet)	Chord (feet)	Interior Angle (degrees)	Arc (feet)	Flow Area (ft^2)	Actual Flow, q (cfs)	Critical Depth, dc (in)	Critical Depth, dc (feet)	
3	Find Critical Depth	2.50	1.25	2.38	144.71	3.16	3.38	24.51	19.55	1.63	Flow Supercritical

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PRESENT MAXIMUM DAILY FLOW = 15.84 MGD (TWO CONSTANT SPEED PLUS TWO VARIABLE SPEED SAWMILL RUN PUMPS)

		Flow Depth, d (feet)	Diameter (feet)	Radius (feet)	Chord (feet)	Interior Angle (degrees)	Arc (feet)	Flow Area (ft^2)	Actual Velocity (fps)	Kinetic Energy (ft)	EGL, up (feet)	
	24B-25									d =	218.03	
4	EGL (Up)	0.78	2.50	1.25	2.31	135.33	2.95	1.30	18.91	5.55	223.58	MH Invert Needs Lowered

		"K" Factor	Flow (MGD)	Kinetic Energy (ft)	Minor Head Loss (ft)	EGL (feet)
						223.58
5	Manhole Loss (Fig. 8-15; Straight Thru)	0.02	15.84	0.00	0.00	223.58

		Flow Depth, d (feet)	Diameter (feet)	Radius (feet)	Chord (feet)	Interior Angle (degrees)	Arc (feet)	Flow Area (ft^2)	Actual Velocity (fps)	Kinetic Energy (ft)	EGL, up (feet)
	25-738									d =	218.03
6	EGL (Down)	0.78	2.50	1.25	2.31	135.33	2.95	1.30	18.91	5.55	223.58

BG. FROM MANHOLE MH-25 TO MANHOLE MH-738 — T/MH 230.32

	Description	n	1.486/n	Diameter (inches)	Length (feet)	Invert Down (feet)	Invert Up (feet)	Slope, S	S^0.50	Hydraulic Radius, Rh	Rh^.667	Velocity, V (fps)	Flow Area, A (ft^2)	Full Pipe Flow, Q (cfs)	Full Pipe Flow, Q (MGD)
1	Check Full Pipe Flow Velocity, V=(1.486/n)*(Rh)^(0.667)*(S)^(0.5)	0.013	114.308	30.00	54.00	217.25	221.55	0.0796	0.282	0.625	0.731	23.576	4.909	115.727	74.794

		Diameter (inches)	Actual Flow, q (MGD)	Actual Flow, q (cfs)	q/Q	Theoretical d/D	Flow Depth, d (in)	Flow Depth, d (ft)
2	Find Partial Pipe Flow Depth	30.00	15.839	24.51	0.21	0.31	9.30	0.78

		Diameter (feet)	Radius (feet)	Chord (feet)	Interior Angle (degrees)	Arc (feet)	Flow Area (ft^2)	Actual Flow, q (cfs)	Critical Depth, dc (in)	Critical Depth, dc (feet)
3	Find Critical Depth	2.50	1.25	2.38	144.71	3.16	3.38	24.51	19.55	1.63

Flow Supercritical

		Flow Depth, d (feet)	Diameter (feet)	Radius (feet)	Chord (feet)	Interior Angle (degrees)	Arc (feet)	Flow Area (ft^2)	Actual Velocity (fps)	Kinetic Energy (ft)	EGL, up (feet)	
	25-738									d =	222.33	
4	EGL (Up)	0.78	2.50	1.25	2.31	135.33	2.95	1.30	18.91	5.55	227.88	MH Invert Needs Lowered

		"K" Factor	Flow (MGD)	Kinetic Energy (ft)	Minor Head Loss (ft)	EGL (feet)
						227.88
5	Manhole Loss (Fig. 8-15; 22.5 Deg)	0.10	15.84	0.00	0.00	227.88

		Flow Depth, d (feet)	Diameter (feet)	Radius (feet)	Chord (feet)	Interior Angle (degrees)	Arc (feet)	Flow Area (ft^2)	Actual Velocity (fps)	Kinetic Energy (ft)	EGL, up (feet)	
	738-739									d =	222.33	
6	EGL (Down)	0.78	2.50	1.25	2.31	135.33	2.95	1.30	18.91	5.55	227.88	

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PRESENT MAXIMUM DAILY FLOW = 15.84 MGD (TWO CONSTANT SPEED PLUS TWO VARIABLE SPEED SAWMILL RUN PUMPS)

BH. FROM MANHOLE MH-738 TO MANHOLE MH-739

T/MH 231.80

	Description	n	1.486/n	Diameter (inches)	Length (feet)	Invert Down (feet)	Invert Up (feet)	Slope, S	S^0.50	Hydraulic Radius, Rh	Rh^.667	Velocity, V (fps)	Flow Area, A (ft^2)	Full Pipe Flow, Q (cfs)	Full Pipe Flow, Q (MGD)
1	Check Full Pipe Flow Velocity, V=(1.486/n)*(Rh)^(0.667)*(S)^(0.5)	0.013	114.308	30.00	40.00	221.55	224.75	0.0800	0.283	0.625	0.731	23.630	4.909	115.996	74.968

		Diameter (inches)	Actual Flow, q (MGD)	Actual Flow, q (cfs)	q/Q	Theoretical d/D		Flow Depth, d (in)	Flow Depth, d (ft)
2	Find Partial Pipe Flow Depth	30.00	15.839	24.51	0.21	0.31		9.30	0.78

		Diameter (feet)	Radius (feet)	Chord (feet)	Interior Angle (degrees)	Arc (feet)	Flow Area (ft^2)	Actual Flow, q (cfs)	Critical Depth, dc (in)	Critical Depth, dc (feet)	
3	Find Critical Depth	2.50	1.25	2.38	144.71	3.16	3.38	24.51	19.55	1.63	Flow Supercritical

		Flow Depth, d (feet)	Diameter (feet)	Radius (feet)	Chord (feet)	Interior Angle (degrees)	Arc (feet)	Flow Area (ft^2)	Actual Velocity (fps)	Kinetic Energy (ft)	EGL, up (feet)	
	738-739									d =	225.53	
4	EGL (Up)	0.78	2.50	1.25	2.31	135.33	2.95	1.30	18.91	5.55	231.08	MH Invert Needs Lowered

		"K" Factor	Flow (MGD)	Kinetic Energy (ft)	Minor Head Loss (ft)	EGL (feet)
						227.50
5	Manhole Loss (Fig. 8-15; 22.5 Deg)	0.10	15.84	4.08	0.41	227.09

		Flow Depth, d (feet)	Diameter (feet)	Radius (feet)	Chord (feet)	Interior Angle (degrees)	Arc (feet)	Flow Area (ft^2)	Actual Velocity (fps)	Kinetic Energy (ft)	EGL, up (feet)	
	739-26									d =	226.03	
6	EGL (Down)	1.28	2.50	1.25	2.50	177.71	3.88	2.51	9.75	1.48	227.50	

BI. FROM MANHOLE MH-739 TO MANHOLE MH-26

T/MH 235.85

	Description	n	1.486/n	Diameter (inches)	Length (feet)	Invert Down (feet)	Invert Up (feet)	Slope, S	S^0.50	Hydraulic Radius, Rh	Rh^.667	Velocity, V (fps)	Flow Area, A (ft^2)	Full Pipe Flow, Q (cfs)	Full Pipe Flow, Q (MGD)
1	Check Full Pipe Flow Velocity, V=(1.486/n)*(Rh)^(0.667)*(S)^(0.5)	0.013	114.308	30.00	236.00	224.75	227.85	0.0131	0.115	0.625	0.731	9.575	4.909	47.003	30.378

		Diameter (inches)	Actual Flow, q (MGD)	Actual Flow, q (cfs)	q/Q	Theoretical d/D		Flow Depth, d (in)	Flow Depth, d (ft)
2	Find Partial Pipe Flow Depth	30.00	15.839	24.51	0.52	0.51		15.30	1.28

		Diameter (feet)	Radius (feet)	Chord (feet)	Interior Angle (degrees)	Arc (feet)	Flow Area (ft^2)	Actual Flow, q (cfs)	Critical Depth, dc (in)	Critical Depth, dc (feet)	
3	Find Critical Depth	2.50	1.25	2.38	144.71	3.16	3.38	24.51	19.55	1.63	Flow Supercritical

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		Flow Depth, d (feet)	Diameter (feet)	Radius (feet)	Chord (feet)	Interior Angle (degrees)	Arc (feet)	Flow Area (ft^2)	Actual Velocity (fps)	Kinetic Energy (ft)	EGL, up (feet)	
	739-26									d =	229.13	
4	EGL (Up)	1.28	2.50	1.25	2.50	177.71	3.88	2.51	9.75	1.48	230.60	OK
					"K" Factor	Flow (MGD)		Kinetic Energy (ft)	Minor Head Loss (ft)		EGL (feet)	
											230.65	
5	Manhole Loss (Fig. 8-15; Straight Thru)				0.02	15.84		0.08	0.00		230.65	
		Flow Depth, d (feet)	Diameter (feet)	Radius (feet)	Chord (feet)	Interior Angle (degrees)	Arc (feet)	Flow Area (ft^2)	Actual Velocity (fps)	Kinetic Energy (ft)	EGL, up (feet)	
	26-27									d =	229.10	
6	EGL (Down)	1.25	2.50	1.25	2.50	180.00	3.93	2.45	10.00	1.55	230.65	

BJ. FROM MANHOLE MH-26 TO MANHOLE MH-27

T/MH 236.40

	Description	n	1.486/n	Diameter (inches)	Length (feet)	Invert Down (feet)	Invert Up (feet)	Slope, S	S^0.50	Hydraulic Radius, Rh	Rh^.667	Velocity, v (fps)	Flow Area, A (ft^2)	Full Pipe Flow, Q (cfs)	Full Pipe Flow, Q (MGD)
1	Check Full Pipe Flow														
	Velocity, V=(1.486/n)*(Rh)^(0.667)*(S)^(0.5)	0.013	114.308	30.00	66.00	227.85	228.80	0.0144	0.120	0.625	0.731	10.023	4.909	49.202	31.800

		Diameter (inches)	Actual Flow, q (MGD)	Actual Flow, q (cfs)	q/Q	Theoretical d/D	Flow Depth, d (in)	Flow Depth, d (ft)
2	Find Partial Pipe Flow Depth	30.00	15.839	24.51	0.50	0.50	15.00	1.25

		Diameter (feet)	Radius (feet)	Chord (feet)	Interior Angle (degrees)	Arc (feet)	Flow Area (ft^2)	Actual Flow, q (cfs)	Critical Depth, dc (in)	Critical Depth, dc (feet)	
3	Find Critical Depth	2.50	1.25	2.38	144.71	3.16	3.38	24.51	19.55	1.63	Flow Supercritical

		Flow Depth, d (feet)	Diameter (feet)	Radius (feet)	Chord (feet)	Interior Angle (degrees)	Arc (feet)	Flow Area (ft^2)	Actual Velocity (fps)	Kinetic Energy (ft)	EGL, up (feet)	
	26-27									d =	230.05	
4	EGL (Up)	1.25	2.50	1.25	2.50	180.00	3.93	2.45	10.00	1.55	231.60	OK
					"K" Factor	Flow (MGD)		Kinetic Energy (ft)	Minor Head Loss (ft)		EGL (feet)	
											231.90	
5	Manhole Loss (Fig. 8-15; Straight Thru)				0.02	15.84		0.75	0.02		231.89	
		Flow Depth, d (feet)	Diameter (feet)	Radius (feet)	Chord (feet)	Interior Angle (degrees)	Arc (feet)	Flow Area (ft^2)	Actual Velocity (fps)	Kinetic Energy (ft)	EGL, up (feet)	
	27-29A									d =	229.60	
6	EGL (Down)	0.80	2.50	1.25	2.33	137.80	3.01	1.35	12.18	2.30	231.90	

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BK, FROM MANHOLE MH-27 TO MANHOLE MH-29A — T/MH 248.95

	Description	n	1.486/n	Diameter (inches)	Length (feet)	Invert Down (feet)	Invert Up (feet)	Slope, S	S^0.50	Hydraulic Radius, Rh	Rh^.667	Full Pipe Velocity, V (fps)	Flow Area, A (ft^2)	Full Pipe Flow, Q (cfs)	Full Pipe Flow, Q (MGD)
1	Check Full Pipe Flow														
	Velocity, V=(1.486/n)*(Rh)^(0.667)*(S)^(0.5)	0.013	114.308	30.00	405.00	228.80	241.94	0.0324	0.180	0.625	0.731	15.049	4.909	73.870	47.742

		Diameter (inches)	Actual Flow, q (MGD)	Actual Flow, q (cfs)	q/Q	Theoretical d/D		Flow Depth, d (in)	Flow Depth, d (ft)
2	Find Partial Pipe Flow Depth	30.00	10.656	16.49	0.22	0.32		9.60	0.80

		Diameter (feet)	Radius (feet)	Chord (feet)	Interior Angle (degrees)	Arc (feet)	Flow Area (ft^2)	Actual Flow, q (cfs)	Critical Depth, dc (in)	Critical Depth, dc (feet)
3	Find Critical Depth	2.50	1.25	2.50	176.16	3.84	2.56	16.49	15.50	1.29
										Flow Supercritical

		Flow Depth, d (feet)	Diameter (feet)	Radius (feet)	Chord (feet)	Interior Angle (degrees)	Arc (feet)	Flow Area (ft^2)	Actual Velocity (fps)	Kinetic Energy (ft)	EGL, up (feet)
	MH-29A									d =	242.74
4	EGL (Up)	0.80	2.50	1.25	2.33	137.80	3.01	1.35	12.18	2.30	245.04

EXHIBIT E

EAST NORRITON-PLYMOUTH-WHITPAIN JOINT SEWER AUTHORITY

HIGH FLOW MAINTENANCE PLAN

EXHIBIT E

EAST NORRITON-PLYMOUTH-WHITPAIN JOINT SEWER AUTHORITY

HIGH FLOW MAINTENANCE PLAN

I. INTRODUCTION

The East Norriton-Plymouth-Whitpain Joint Sewer Authority (Authority) owns, operates and maintains the wastewater treatment facility (WWTF) located at 200 Ross Street, Plymouth Meeting, Pennsylvania. The WWTF consists of two parallel wastewater treatment plants. One treatment plant is a trickling filter (TF) plant and the other is an activated sludge (AS) plant.

All raw sewage into the WWTF first enters into the AS pump wetwell, located in the rear of the Pump/Control Building (Building B-1). Approximately one-third to one-half of the raw sewage is pumped from this wetwell to the AS plant. The remaining raw sewage flows by gravity from the AS plant wetwell to the TF plant wetwell, located in Building EPS-1. The on/off pump settings for the AS plant raw sewage pumps determine the wetwell levels that the pumps will operate, in turn controlling the flow of raw sewage to the TF plant wetwell.

II NORMAL OPERATION

The AS plant raw sewage pumping station contains three (3) raw sewage pumps that are located in the Pump/Control Building. All pumps are rated at 3,900 gpm. One pump is operated by a variable frequency drive, and the other two pumps are operated by constant speed motors. The TF plant raw sewage pumping station contains three (3) raw sewage pumps that are located in Building EPS-1. All three pumps are operated by variable frequency drives and are rated at 4,000 gpm. Under normal conditions, the plant's Supervisory Control and Data Acquisition (SCADA) system sequentially activates the three (3) AS plant raw sewage pumps and the three (3) TF plant raw sewage pumps at certain "trigger points" based on the influent wetwell depth as flow and water level in the Building B-1 wetwell increases.

The pump level control system for the AS plant wetwell has been installed such that the "zero" point for the sewage level in the wetwell, as measured by the level controller, is equal to an actual sewage level of 5 feet in the wetwell. All pump start elevations are, therefore, based on a wetwell level that is "x" number of feet above the 5 feet (or zero) reference point. The pump start elevations for the AS raw sewage pumps are as follows:

- Lead Pump start level: 12.27 feet
- Lag Pump start level: 13.12 feet
- Lag-Lag Pump start level: 13.50 feet
- Wetwell High Level Alarm: 14.00 feet

As the AS wetwell sewage level increase in elevation, the volume of sewage flowing to the TF plant wetwell also increases. By the time that the AS wetwell level has risen to an elevation equal to the start point for the AS Lag-Lag Pump, all three TF raw sewage pumps will have gone into operation.

III HIGH FLOW OPERATION

1. Chemical Road

At the high flow "trigger point" where all six (6) of the raw sewage pumps are activated and the wetwell sewage in the AS plant wetwell has reached a level of 14.00 feet, a "Wetwell High Level Alarm" will be generated by the plant SCADA system. The level of 14.00 feet is approximately 2.0 feet below the wetwell level that will result in an overflow of sewage from a manhole on the lower end of Ross Street.

A "Wetwell High Level Alarm" will cause the SCADA system to immediately telephone a series of treatment plant operator and management personnel until the alarm is acknowledged. Immediately following the acknowledgement of the alarm, the appropriate personnel will close a manually operated slide gate in Manhole #1A (which is located adjacent to the southeast corner of Building B-1). This action will prevent the normal conveyance of raw sewage flow from the Chemical Road Pump Station to the Building B-1 wetwell, and will shunt the flow through a manually cleaned bar screen into the East Trickling Filter Plant primary settling tanks (see Figure 1). This action allows the flow from Chemical Road to be processed completely in the WWTF without overloading the raw sewage pump wetwell and keeps all flow within the plant's tanks. Even with these flows, the WWTF is hydraulically balanced.

The treatment plant operators will periodically clean the manually cleaned barscreen at the East Trickling Filter Plant primary tanks. The barscreen will be checked and cleaned on a regular basis while the Chemical Road Pump Station raw sewage flow is being shunted directly into the primary tanks.

Once the rain event has ended, the raw sewage flows into the WWTF will begin to subside. Eventually the AS plant wet well level will decrease to a point where the "Wetwell High Level Alarm" is cleared. As the level continues to decrease, the AS plant Lag-Lag raw sewage pump will stop. The pump "stop" level for the Lag-Lag pump is 12.75 feet. At this point, the treatment plant operators will reopen the manually operated slide gate in Manhole #1A and redirect the Chemical Road Pump Station raw sewage flow to the wetwell in Building B-1.

2. Activated Sludge Plant Sludge Blankets

The WWTF treatment plant operators will monitor the sludge blanket levels in the AS plant secondary clarifiers to prevent solids from overflowing the clarifier weirs. Return activated sludge rates will be monitored and adjusted to control the depth of the sludge blankets in the secondary clarifiers. If the sludge blankets cannot be properly controlled through adjustment of the return activated sludge flow rates, the quantity of air to the aeration tanks will temporarily be lowered to maintain the sludge biomass in the aeration tanks and reduce the flow of activated sludge solids to the secondary clarifiers.

3. Schuylkill River Monitoring

The WWTF treatment plant operators will monitor the level of the Schuylkill River to ascertain its affect on the discharge weir of the TF plant chlorine contact tanks, and for documenting of TF plant flow and pacing of chlorine feed. (Note: The discharge weir of the AS plant chlorine contact tanks is at a much higher elevation above the weir of the TF plant chlorine contact tanks, and its discharge of effluent will not be affected by an increase in river water level.) Weirs can become submerged at high river levels and should the degree and depth of submergence be too great it could affect the flow through the WWTF.

4. Sawmill Run Pumping Station

The WWTF staff will monitor the operation of the Sawmill Pumping Station and gravity interceptor at high flows to limit any surcharging within the collection and conveyance system.

FIGURE 1

EAST NORRITON-PLYMOUTH-WHITPAIN JOINT SEWER AUTHORITY

WASTEWATER TREATMENT PLANT

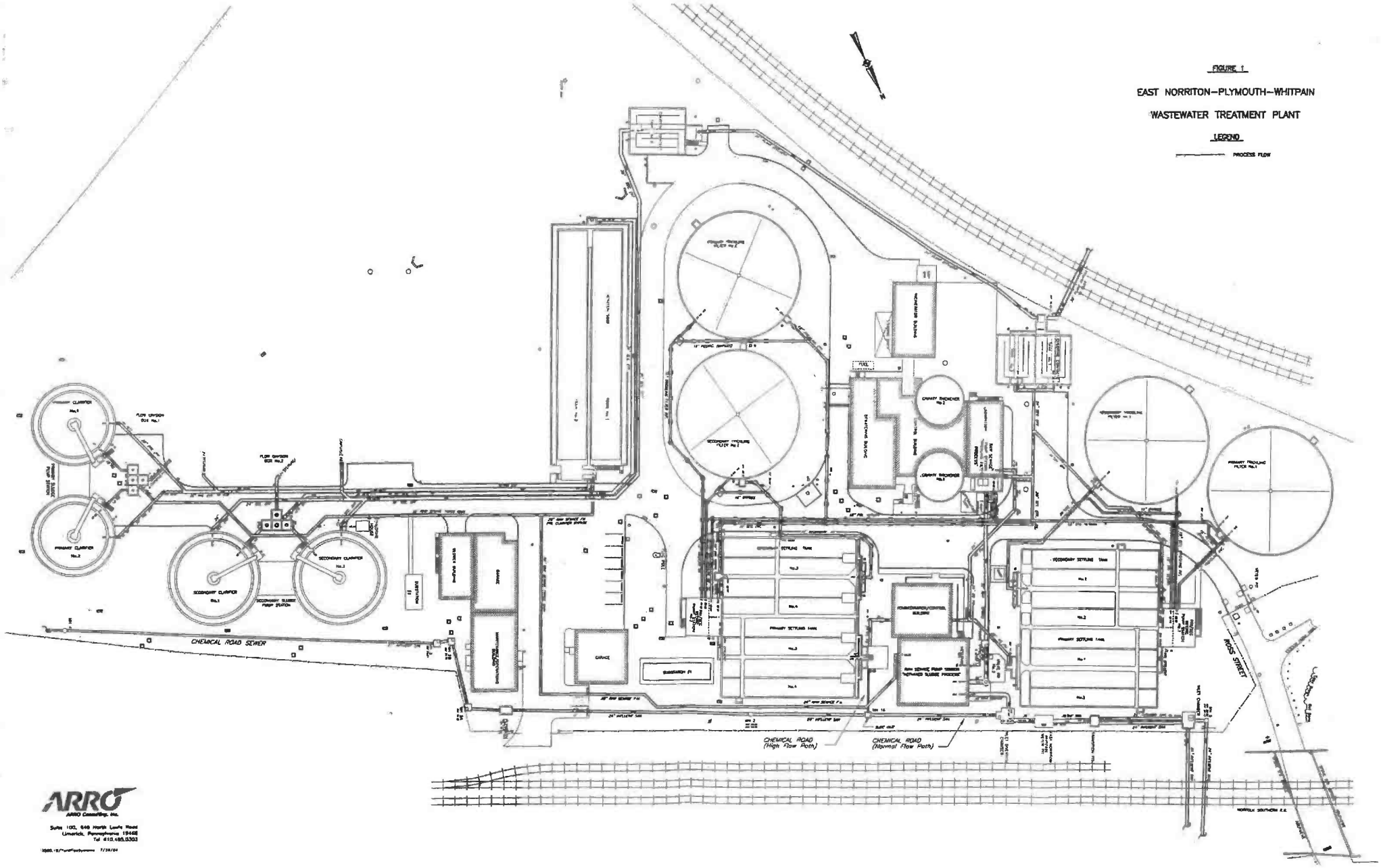
FIGURE 1

EAST NORRITON–PLYMOUTH–WHITPAIN

WASTEWATER TREATMENT PLANT

LEGEND

PROCESS FLOW



ARRO
ARRO Consulting, Inc.
Suite 100, 649 North Lewis Road
Limerick, Pennsylvania 19468
Tel 610.495.5303

EXHIBIT F

EAST NORRITON-PLYMOUTH-WHITPAIN JOINT SEWER AUTHORITY

INFILTRATION/INFLOW SUMMARY

East Norriton-Plymouth-Whitpain Joint Sewer Authority
Infiltration /Inflow Summary
Exhibit F

INTRODUCTION

The Authority and the three (3) member municipalities have maintained active I/I programs. However, the Authority has limited collection system facilities within which storm water can intrude. Therefore, I/I abatement must stem primarily from the contributing municipalities. Provided herein are summaries of the recent or notable activities relating to I/I abatement undertaken by the Authority and the member municipalities and the future work projected by each. Please be advised that all future efforts and the degree of their success are predicated on suitable weather to conduct the appropriate analyses and repair.

AUTHORITY ACTIVITY

As noted earlier, during the years 2003 and 2004, this area of southeastern Pennsylvania received unusually high amounts of precipitation. The Authority, as well as numerous other entities experienced significant increases in flows, which challenged the capacity of the conveyance system. The Authority's conveyance system consists primarily of the Sawmill Run Pumping Station, force mains and gravity interceptors that transmit wastewater from the three (3) municipalities to the treatment plant. During 2003, the Authority carefully monitored flow for the three (3) municipalities contributing to the Sawmill Run Pumping Station to determine peak flows and to establish a 12-month "profile" for each. This profile was an estimate of the peak contribution from each municipality and the time it took for that peak contribution to reach the pump station, which was then correlated with rainfall intensity and duration. This provided the Authority with a clearer picture as to what to expect under certain rainfall conditions and allowed for Authority personnel to prepare operationally with the weather forecast.

In 2004, the Authority undertook flow monitoring of the Sawmill Run gravity interceptor. Flow meters were installed at strategic points along the interceptor to ascertain whether or not there was significant I/I contribution from the Authority mains. Further, this allowed the Authority to monitor the contribution from Plymouth Township along the interceptor and crosscheck the flow meters at Sawmill Run Pumping Station and the treatment plant. The Authority determined that no I/I contribution of significance existed along the interceptor and the high flows were introduced upstream of the pumping station. Further, the Authority noted the discrepancy in the flow pattern between the two 24-inch interceptors on Ross Street and diagnosed the junction box as the cause. This junction box is addressed within the milestones of the CAP.

Early this year, the Authority directed its consulting engineer to develop a capital improvement program to meet future flow and treatment needs that included improvements at the treatment plant and the Sawmill Run Pumping Station, force main and gravity interceptor. To better identify the improvements necessary at the Sawmill Run Pumping Station, force main and gravity interceptor, the Authority directed its consulting engineer to initiate a hydraulic analysis of the facilities and develop recommendations for modification. This proactive authorization was given at the February 9, 2005 regular meeting of the Authority, prior to receipt of a Notification of Violation (NOV) from PADEP for system overflows.

The result of this hydraulic analysis will be a capital improvement program for the Authority conveyance system. Preliminary information from the monitoring undertaken in 2003 and 2004 allowed the Authority to identify the improvements delineated within the milestones as proper and helpful to the control of I/I, even before PADEP involvement.

EAST NORRITON TOWNSHIP

The Township has maintained active I/I abatement and capital improvement programs within the sanitary sewer system for the past 15 years. A key date was February 25, 1991 when the Township adopted Ordinance No. 296, where through the Use and Occupancy permitting process, "...no sump pump or other storm water collection system may be connected into the sanitary sewer system." Recognizing the responsibility to I/I abatement, the Township authorized a $600,000 contract for I/I work in 1993 and 1994 that included 263,336 L.F. of sanitary sewer televised and 54,054 joints tested of which 35,017 failed. The Township used 36,020 gallons of grout to repair these joints, which resulted in approximately 250,000 gallons per day of I/I removed. In late 1993, the Township also undertook a major capital overhaul of the Germantown, Timberlake and Norris City Pumping Stations to modify capacity to more expeditiously pass flow. A $3.3 million bond financed this program. The pumping station rehabilitation project financed through this bond issue was substantially completed in May 1997.

Following this major undertaking, the Township continued spot sewer repairs as identified and after much review established improved Sanitary Sewer Construction Standards in 1998. In 1998, the Township also bid and purchased a sewer camera ($85,000) and in 1999 a High Pressure Jet Cleaner ($87,000) to assist in identifying problem areas and to eliminate blockages.

In March 2000 the Township passed Sewer Use Ordinance No. 419 which reinforced Ordinance No. 296 regarding unauthorized connections to the sanitary sewer system. This ordinance provided the Township with the "teeth" needed to deter improper storm water connections.

In 2002, engineering began on an upgrade to the Sandra Lane Pumping Station to improve capacity. This project was awarded ($159,000) and constructed in 2003. Concurrent with the work at Sandra Lane, Township staff began a flow metering analysis and a main televising program within the pump station drainage area (2003 – 2004). This included a house-to-house search for improper connections (sump pumps and roof drains).

In 2004, the Township contracted with ARRO Consulting, Inc. to begin a comprehensive study of the western end of the collection system (upstream of the Germantown PS). This work included flow metering to establish subdrainage areas of significance, house to house inspections for sump pump and roof drain connections, dye testing and televising. To date, approximately 290,000gallons per day has been quantified from televising lateral connections within one of three (3) significant subdrainage areas in the west end. This work will continue through 2005.

Concurrent with this work, Township staff continues to televise other areas within the western end to locate errant flows. The Township has authorized and ordered a lateral camera to work in conjunction with ARRO during 2005 and beyond. The Township has also initiated a capital improvement project to be completed during 2005 and 2006 that will replace or slip-line approximately 300 L.F. of sanitary sewer.

Within East Norriton Township, the homeowner has the responsibility to repair any leakage found in the lateral between the curb line and the structure. The Township is responsible between the main and the curb line. Under current ordinances, the Township can require the homeowners to make the repairs within a certain period of time. Otherwise, the Township has the authority to make the repairs and bill the homeowner. The Township is currently investigating the financial issues of undertaking a large number of the corrections in bulk to facilitate a lower cost to homeowners.

PLYMOUTH TOWNSHIP

The Township has maintained active I/I abatement and capital improvement programs within the sanitary sewer system for the past 15 years. In 1992 and 1993 the Township invested $138,000 in a Sanitary Sewer Evaluation Study (SSES) to determine the adequacy of the collection system and to identify problem areas including those prone to I/I. From this study, the Township initiated a series of projects for repair or rehabilitation of sewers and pumping stations. In 1994, sewer main repairs and grouting were completed ($124,000) and in 1995 – 1996 a two-phase pump station rehabilitation project ($582,000) to improve flow capacities was completed.

In 1998, the Township completed a project to clean and televise all eight (8) major interceptors ($121,000). This project included making repairs that were previously identified. In 2000, the Township completed rehabilitation and an upgrade of the Chemical Road Pumping Station. This project improved the capacity of the station to more expeditiously pass flow through to the treatment plant. A second project was also completed that year which included replacement of the portion of the Plymouth Creek gravity interceptor ($464,000) under the PA Turnpike along unnamed Tributary No. 2 to Plymouth Creek. In 2000, a cured in-place repair of a 3,200 L.F. portion of the Church Road Interceptor ($209,000) was completed.

The Township began in 2003 and finished in 2004 a cleaning, televising, joint pressure testing and grouting project in several areas of the Township. These included Plymouth Valley, Sheffield, Plymouth Hills and Plymouth Meeting Park. This project ($168,000) improved the integrity of these areas of the collection system and reduced I/I. Also in 2004 the Township began work on the Narcissa Road Pump Station and force main. Completed in 2005, this project ($755,000) has improved the capacity of the station, thereby assisting in the conveyance of flow to the treatment plant. It also greatly improves a facility where the wet well volumes had become stressed due to flow volume. The Township during 2005 began the planning phase for the replacement of a portion of the Diamond Run gravity interceptor along Manor Avenue. This project is a continuation of the aggressive approach to I/I taken by the Township. Currently, the extent of the replacement is being identified and will improve flow through the conveyance system while reducing I/I.

Within Plymouth Township, the homeowner has the responsibility to repair any leakage found in the lateral between the sewer main and the structure. Under current ordinances the Township can require the homeowners to make the repairs within a certain period of time. Otherwise, the Township has the authority to make the repairs and bill the homeowner. Further, the Township maintains a current ordinance (April 9, 1979) that strictly forbids the connection of a sump pump, roof drain or foundation drain or any other source of groundwater, surface water or cooling water to the sanitary sewer system. The Township can regulate this before issuance of a Use & Occupancy Permit for a new connection or if an inappropriate discharge coming from an existing connection is observed during televising.

WHITPAIN TOWNSHIP

The Township has maintained active I/I abatement and capital improvement programs within the sanitary sewer system for the past 10 years. From 1997 to 1999, Township staff televised the entire sanitary sewer system. This was performed at an average of 85,000 L. F. per year. Areas where problems were identified were repaired as staff progressed. This included pressure testing and grouting of pipe joints and repairs to manholes. From 2000 to 2004, a comprehensive flow-monitoring program was undertaken throughout the Township. This included further televising of the sewer mains at a rate of approximately 100,000 L.F. per year. Again, repairs to mains, manholes and laterals were undertaken where needed. During 2005, Township staffs are televising the primary interceptors that convey flow to the Authority system. Repairs to manholes, laterals and main sewer lines are being completed as needed.

Within Whitpain Township, the homeowner has the responsibility to repair any leakage found in the lateral between the curb line and the structure. The Township is responsible from the main to the curb line. The Township has currently drafted Ordinance No. 36 – 14 scheduled for adoption at the September 20, 2005 meeting prohibiting any introduction of storm water, surface water, groundwater, roof run-off or other subsurface drainage into the sanitary sewer system. This ordinance provides the means and methods for mitigation should such a discharge be discovered and establishes penalties. It also requires the homeowners to make the determined repairs within a certain period of time. Otherwise, the Township has the authority to make the repairs and bill the homeowner.

CONTINUED I/I ABATEMENT

All three (3) Townships propose the continuation of sewer/lateral televising to identify problem locations. It is their intent to clean and repair sanitary sewers and laterals wherever needed. The Townships will continue to undertake pressure testing of sewers and manholes and grouting or sliplining for repair where needed.

The Townships will continue to inspect all interceptors located in or near waterways and flood prone areas. Where applicable, manhole rims will be elevated above flood stage with bolt down, watertight lids as appropriate. The Townships will continue to inspect and remediate lateral vents with missing or inappropriate (open grate) covers located in low-lying areas susceptible to inflow. Also, the Townships will continue an education program for all residents through newsletters and websites to identify and eliminate sump pumps, roof and foundation drains and other storm water cross connections.

The Townships will revisit their local sanitary sewer specifications to ensure that these parameters are current and consider all of the International Code Council's International Codes (Act 45 of 1999).

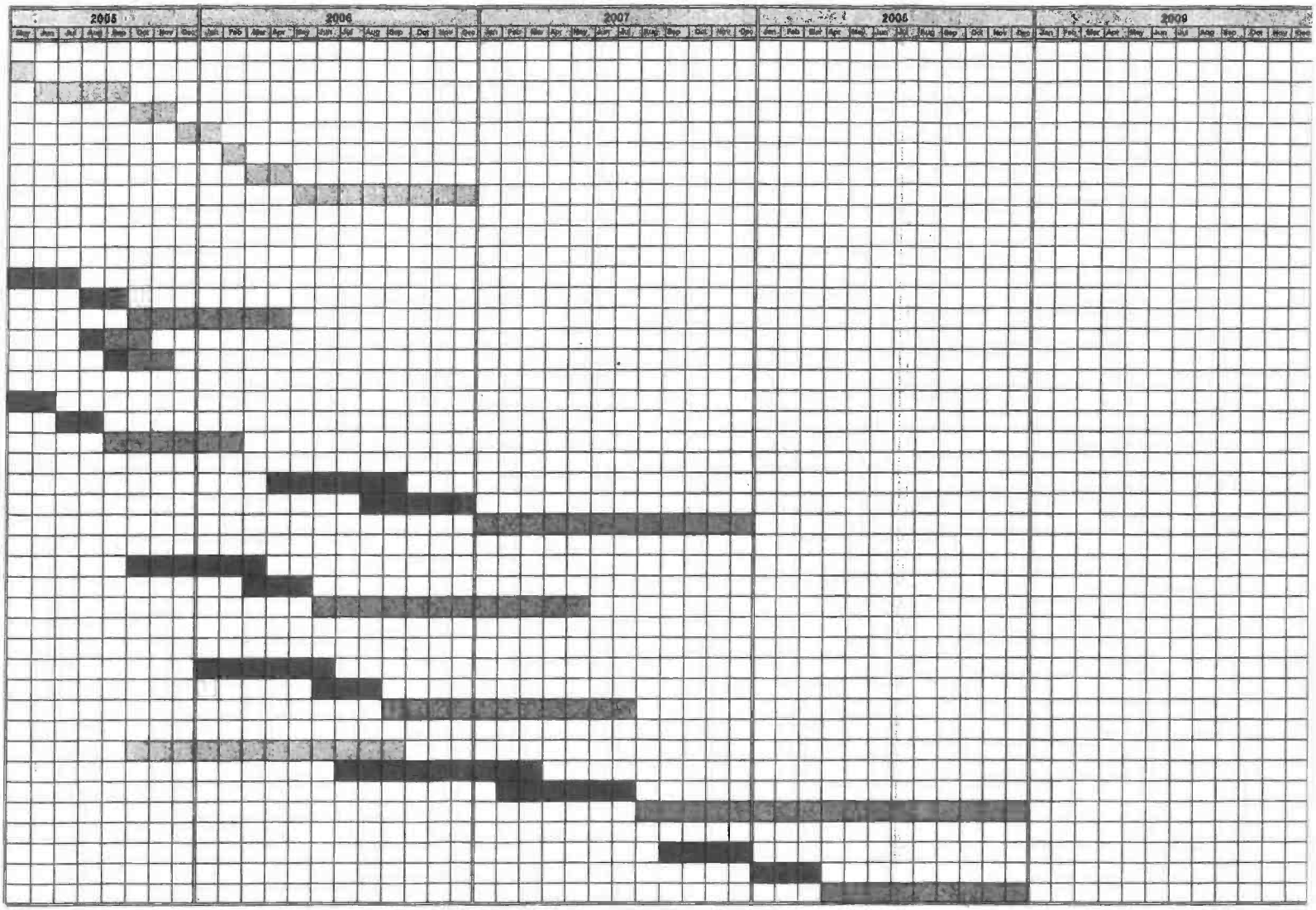
APPENDIX B

IMPLEMENTATION SCHEDULES

EAST NORRITON-PLYMOUTH-WHITPAIN JOINT SEWER AUTHORITY

CAPITAL IMPROVEMENT PROGRAM

PRELIMINARY SCHEDULE



Implementation Schedule
Act 537 Planning
Upgrades

Description of System Additions or Improvements	Tasks	2007	2008	2009	2010	2011
? Planning Approval						
)-foot diameter clarifier	Preliminary Design					
	Address PNDI and PHMC Constraints					
	WQM Part II Permit Application					
	Final Design					
	Project Bid					
	Project Award					
	Begin Construction					
	End Construction					
80,000 gallon aeration tank	Preliminary Design					
	Address PNDI and PHMC Constraints					
	WQM Part II Permit Application					
	Final Design					
	Project Bid					
	Project Award					
	Begin Construction					
	End Construction					
70-foot diameter secondary clarifier	Preliminary Design					
	Address PNDI and PHMC Constraints					
	WQM Part II Permit Application					
	Final Design					
	Project Bid					
	Project Award					
	Begin Construction					
	End Construction					
) 92,000 chlorine contact tank	Preliminary Design					
	Address PNDI and PHMC Constraints					
	WQM Part II Permit Application					
	Final Design					
	Advertise Project for Bid					
	Bid Opening					
	Start Construction					
	Complete Construction					
S/WAS system upgrades	Preliminary Design					
	Address PNDI and PHMC Constraints					
	WQM Part II Permit Application					
	Final Design					
	Project Bid					
	Project Award					
	Begin Construction					
	End Construction					
pgrades to pumping structures for distribution	Preliminary Design					
	Address PNDI and PHMC Constraints					
	WQM Part II Permit Application					
	Final Design					
	Project Bid					
	Project Award					
	Begin Construction					
	End Construction					

APPENDIX C

EXCERPTS FROM MUNICIPAL 537 PLANS

EDM CONSULTANTS, INC.
1101 South Broad Street, Suite 200, P. O. Box 1545, Lansdale, PA 19446
Phone (215) 393-0670 Fax (215) 393-0652

May 13, 2005

RECEIVED
MAY 16 2005
ARRO

Mr. William L. Bohner, Jr. P.E.
ARRO Consulting, Inc.
649 N. Lewis Road, Suite 100
Limerick, PA 19468-1234

RE: East Norriton Township
Act 537 Plan Update
Revised Preliminary Sewage Needs

FILE: 158-037 (1.00)

Dear Bill:

Following the ENPWJSA Regional Act 537 Plan meeting on April 27, 2005, the sewage needs for East Norriton Township were revisited.

The evaluation included a review of year 2004 flows to establish existing sewage flow and projected future development based on existing Parcel zoning.

The evaluation indicated the following sewage needs for East Norriton Township:

Projected average 3-month maximum: 3.3 mgd

Projected average annual flow: 2.7 mgd.

Please note the average annual flow need is consistent with East Norriton Township's existing capacity of 2.7 mgd at the ENPWJSA. An additional 0.2 mgd of average 3-month maximum capacity is projected to be required.

The identified sewage needs has been discussed with the Township staff but has not been reviewed or approved by the Board of Supervisors.

Very truly yours,

EDM CONSULTANTS, INC.

Stanley J. Endlich, P.E.

pc: Helmuth Baerwald, Manager, East Norriton Township
Mr. Bruce Shoupe, East Norriton Township
Mr. Ed White, East Norriton Township
\037_arro-ENTSewageNeeds-05.doc

S C Engineers, Inc.

Daniel J. Shoemaker, P.E.
Alfred S. Ciottoni, P.E.
Jeffrey J. Morgan, P.E.

January 25, 2006

RECEIVED
JAN 2 7 2006
ARRO

Mr. William L. Bohner, P.E.
ARRO Consulting Inc.
649 North Lewis Road, Suite 100
Limerick, PA 19468-1234

Subject: Whitpain Township Act 537 Plan

Dear Mr. Bohner:

We are submitting, on behalf of Whitpain Township, the enclosed copy of the final Whitpain Act 537 Plan for your incorporation in the regional ENPWJSA Act 537 Plan. The projected wastewater treatment needs for Whitpain Township are presented in greater detail in the Act 537 Plan and may be summarized as follows:

Basis	Treatment Needs (mgd)
Avg. Annual	2.37
Max. 3-Month	3.50

The Whitpain Act 537 Plan has been submitted to the Montgomery County Planning Commission and the Montgomery County Health Department for their review, but has not been formally adopted yet by the Board of Supervisors.

We trust that the enclosed report provides the ENPWJSA with sufficient data to finalize the regional Act 537 planning. Should you have any questions concerning these data, please feel free to contact us.

Very truly yours,

Alfred S Ciottoni

Alfred S. Ciottoni, P.E.

cc: Roman M. Pronczak, Whitpain Township

P.O. Box 407
Fort Washington, PA 19034
Email: ascSCengrs@aol.com
Phone: (215) 836-9912
FAX: (215) 836-0840

Consulting Engineers
and Surveyors

Chambers Associates, Inc.

831 DeKalb Pike
Center Square, PA 19422-1271
610-275-1114
FAX 275-1807

405 East Lancaster Avenue
Wayne, PA 19087-4202
610-688-6166
FAX 610-688-6705

November 13, 2003

Mr. William L. Bohner, Jr., P.E.
The ARRO Group, Inc.
649 North Lewis Road
Suite 100
Limerick, PA 19468-1234

RE: **EAST NORRITON/PLYMOUTH/WHITPAIN JOINT SEWER AUTHORITY**
REGIONAL ACT 537 PLAN
PLYMOUTH TOWNSHIP ACT 537 PLAN

Dear Bill:

As you requested in your memorandum of September 23, 2003, this letter is to present the anticipated wastewater needs for Plymouth Township within the authority service area. As a minimum Plymouth Township will need 0.5 million gallons per day of addition treatment capacity to serve the ultimate build out of Plymouth Township. We request 1.0 million gallons per day in the expanded plant which would allow for changes of zoning and redevelopment.

Very truly yours,

John O. Chambers, Jr., P.E.

JOC/at
docs\joc\253080a.ltr
c: Timothy Boyd

EAST NORRITON TOWNSHIP

ACT 537 PLAN

UPDATE

EAST NORRITON TOWNSHIP

MONTGOMERY COUNTY, PA

November 2005
Final Draft January 2006

EDM CONSULTANTS, INC.
1101 South Broad Street, Suite 200
P.O. Box 1545
Lansdale, PA 19446
(215) 393-0670

East Norriton Township
Act 537 Plan

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APPENDICES

FIGURES

END OF TABLE OF CONTENTS

East Norriton Township
Act 537 Plan Update
November 2005
Final Draft January 2006

Executive Summary

The purpose of this Act 537 Plan Update report is to update East Norriton Township's current Sewage Facilities Plan (Act 537) previously approved in 1992. The 1992 Act 537 plan provided for a revision of the planned sewer service area, expansion of collection and conveyance facilities and an increase in the Township's allocated capacity at the East Norriton Plymouth Whitpain Joint Sewer Authority (ENPWJSA) Treatment Facility. Since 1992 East Norriton Township has been allocated 2.7 mgd of Average Annual Capacity and 3.1 mgd of Maximum Three Month Capacity at the ENPWJSA Treatment Facility. The Act 537 Plan Update reviewed the sanitary sewage needs of East Norriton Township in conjunction with the ENPWJSA Sewage Facilities Plan Update. The Update included the sanitary sewer system, wastewater treatment, potential future growth and the identification of a selected alternate.

Sanitary Sewer System

The East Norriton Township sewage system, shown on Figure 3-1, includes approximately 58 miles of pipes ranging from 8 inches to 24 inches in diameter, three major pumping stations (Germantown, Timberlake and Norris City Avenue), four minor pumping stations (Sandra Lane, Burnside, Shultz Road and Whitehall Road) and two limited service area pump stations (Marion Avenue and Felton Road). The Germantown Pumping Station serves the western area of the township and discharges to the Timberlake Pumping. The central area of the township discharges to the Timberlake Pumping Station which conveys sewage to the Norris City Avenue Pumping Station. The Norris City Avenue Pumping Station serves the eastern area of the township and receives the sewage discharge from the Timberlake Pumping Station. The Norris

City Avenue Pumping Station also receives gravity sewage flow and pumps to the ENPWJSA Sawmill Pump Station.

A part of the Act 537 Sewage Facilities Planning Report update included an investigation of the sanitary sewer collection system to identify and prioritize drainage areas which exhibit extraneous inflow and/or infiltration. The flow monitoring study was conducted throughout the Township utilizing portable meters installed in manholes which segregated several specific drainage areas. The infiltration/inflow (I/I) investigation indicated areas tributary to the Sandra Lane and Germantown Pump Stations experience surcharge conditions.

East Norriton Township has developed a Corrective Action Plan (CAP) to address the I/I situation. The plan discusses the recent and proposed efforts of the Township to reduce I&I contributions into the sanitary sewer system. In addition to implementing the CAP, the Township will continue to monitor, investigate and remediate the sanitary collection and conveyance system to remove and prevent additional extraneous inflow/infiltration to ensure current permitted system capacities are not exceeded.

Wastewater Treatment

East Norriton Township has wastewater treatment capacity at the ENPWJSA Wastewater Treatment Facility. The facility is located in the southwestern corner of Plymouth Township adjacent to the Schuylkill River. It is owned by the ENPWJSA Authority. The ENPWJSA Wastewater Treatment Plant is authorized to discharge to the Schuylkill River under the NPDES Sewage Permit No. PA0026816. The plant presently provides advanced secondary treatment levels through the use two (2) types of treatment processes consisting of trickling filtration and activated sludge. A treatment process upgrade is being investigated to improve treatment efficiency to address more stringent stream discharge limits.

The ENPWJSA Wastewater Treatment Plant has a permitted maximum monthly discharge capacity of 9.3 million gallons per day (mgd) with an annual average flow rating of 8.1 mgd. The 2004 annual average daily flow was 6.45 mgd and the maximum monthly flow was 7.75 mgd. A review of the ENPWJSA Chapter 94 (2004) report projects that the treatment plant will operate within permitted limits for the next 5 years.

Potential Future Growth

There are 209 existing parcels in East Norriton Township utilizing on-lot sewage disposal systems. The Act 537 Plan Update anticipates 170 on-lot systems being connected to the public sewer system leaving 39 on-lot systems. These remaining on-lot systems are located in the western section of the Township in the Trooper Road and Township Line Road area.

The growth areas proposed for this update of the East Norriton Township Act 537 Sewage Facilities Plan, as shown on Figure 3-2, include all tracts of land not currently served by public sewers in all zoning districts. Potential future growth was established based on zoning, a review of the draft Comprehensive Plan Update, areas presently identified for development and the connection of on-lot systems. It is estimated that East Norriton Township's future sewage needs will require an average annual capacity of 2.7 mgd and a maximum monthly capacity of 3.3 mgd.

East Norriton Township has sufficient annual average capacity at the ENPWJSA Wastewater Treatment Facility for the ultimate build out of the remaining land in the growth areas. Additional maximum monthly capacity is, however, needed.

East Norriton Township anticipates the current planned developments to be completed within the next 10 years. Major capital expenditures by the Township are not anticipated for the future sewer system expansion as developers will generally be required to extend sewers to serve their proposed projects.

Selected Alternate

It is proposed East Norriton Township secure additional maximum monthly treatment capacity by participating, on a one-third proportionate share, in the upgrade and expansion of the ENPWJSA treatment facility. Based on a proposed annual average expansion to 8.7 mgd (11.1 mgd maximum monthly) at the ENPWJSA facility, East Norriton Township would acquire the projected needed additional maximum monthly flow capacity to accommodated projected future sewage flows. East Norriton Township's 2003 cost for their share of the 2003 conceptual upgrade/expansion scenario is estimated at $4.8 million. This equates to a capital cost of about $500/EDU. The selected Act 537 Plan Alternate also includes:

1) *Continued implementation of the Corrective Action Plan (CAP) to address sewer system I/I.*
3) *Continued I/I program monitoring, investigation and remediation.*
4) *Continued investigation of alternatives to reduce the peak flows at the Germantown and Sandra Lane Pumping Stations.*
5) *Continued implementation of the Township's OLDS Management program.*
6) *Securing financing for the Township's share of the ENPWJSA upgrade/expansion costs.*

SECTION 1 - INTRODUCTION

1.01 Purpose and Objective

The purpose of this report is to update East Norriton Township's current Sewage Facilities Plan (Act 537) previously approved in 1992.

1.02 Background

East Norriton Township's current Act 537 Plan was approved on July 18, 1992. A copy of the approval letter from the Pennsylvania Department of Environmental Protection is provided in Appendix A. The Act 537 plan provided for a revision of the planned sewer service area, expansion of collection and conveyance facilities and an increase in the Township's allocated capacity at the East Norriton Plymouth Whitpain Joint Sewer Authority (ENPWJSA) Treatment Facility. Since 1992 East Norriton Township has been allocated 2.7 mgd of Average Annual Capacity and 3.1 mgd of Maximum Three Month Capacity at the ENPWJSA Treatment Facility. The original Sewage Facilities Plan was adopted in accordance with Act 537 and Act 247 in 1972 and updated in 1978. The sanitary sewage needs of East Norriton Township were reviewed and evaluated in conjunction with the ENPWJSA Sewage Facilities Plan Update.

1.03 Municipal Planning

East Norriton Township Zoning and Subdivision ordinances provide the guidance for the development of land and the re-development of properties with existing structures. The potential needs for sanitary sewer service for the vacant and existing developed parcels is estimated based on current zoning regulations. EDUs are estimated based on the size of the parcel and the estimated sanitary sewer generation rate per acre as regulated by each zoning

district. The current East Norriton Township Zoning Districts are shown on Figure 1-1 and described as follows:

The East Norriton Township Zoning Ordinance includes twenty two (22) districts generally segregated as: eight (8) residential districts; one (1) institutional district; five (5) commercial districts; five (5) office/professional districts; two (2) industrial districts; and one (1) floodplain district.

AR & ARC Residential Districts - These districts are designed to provide for controlled expansion of low—density development. Single—family detached dwellings, a municipal use or fire house, and a number of accessory uses are the only permitted uses. The minimum lot size vary between the districts. The minimum lot size is 20,000 square feet if public sewer service is provided. To estimate sewage needs, a 3.0 EDU/acre rate for the AR District and 2.5 EDU/acre for the ARC District have been developed based on an average lot size of 20,000 SF with 20% of the gross land area reserved for non-lot uses such as right-of-way and open space.

BP Business and Professional District — This district provides opportunity for a variety of office uses. The permitted uses include offices for administration, sales, insurance, and real estate offices; studios for music and art instruction, and financial institutions. To estimate sewage needs, a 11.0 EDU/acre rate is used for wastewater flow projections based on a minimum lot size of 30,000 SF.

BR & BR1 Residential Districts - These districts are similar to the AR and ARC Districts as they are designed to provide for controlled expansion of low density development. Single family detached dwellings, a municipal use or fire house, and a number of accessory uses are the only permitted uses. The minimum lot size is 10,000 square feet

if public sewer service is provided. To estimate sewage needs, a 2.5 EDU/acre rate for the BR District and 3.5 EDU/acre for the BR1 District have been developed based on an average lot size of 10,000 SF with 20% of the gross land area reserved for non-lot uses such as right-of-way and open space.

C & C1 Commercial Districts - These districts are designed to encourage the development of a variety of commercial uses within certain areas of the Township along major roads to minimize traffic congestion. To estimate sewage needs, a 7.0 EDU/acre rate for the C District and 8.0 EDU/acre for the C1 District have been developed.

EC & EC2 Executive Campus Districts - These districts are designed to encourage the development of a variety of medical, financial and communication office uses within certain areas of the Township. To estimate sewage needs, a 4.0 EDU/acre rate for the EC District and 5.0 EDU/acre for the EC2 District have been developed.

HR High Rise Residential District - This district was established to provide high density residential developments. This type of development shall be designed as a unified architectural unit with appropriate landscaping. The permitted uses include apartment houses, commercial and office uses, and playgrounds. All buildings within the high rise apartment development are to be served by a public sanitary sewage disposal system and public water supply. To estimate sewage needs, a 16.0 EDU/acre rate is based on multi-level structures with an average foot print of 30,000 SF, a 20% open space reserve and a 30% non-housing use.

I Industrial District — This district includes a variety of industrial uses that promotes the general welfare of the Township. The permitted uses include storage, warehousing, distribution and heavy commercial uses. The method of sewage and industrial waste treatment and disposal must be approved by the Board of Supervisors. To estimate sewage needs, a 2.5 EDU/acre rate is used for wastewater flow projections with a maximum building coverage of 20%.

IN Institutional District — The primary purpose of this district is to provide institutional uses, which may include places of worship; public and private schools; mental, medical and surgical hospitals and clinics. To estimate sewage needs a 5.0 EDU/acre is used for wastewater flow projections based on a 20% open space reserve and a 30% non-housing use.

LI Limited Industrial District - This district is designed to encourage non-polluting light industry, office, storage, warehousing and certain light manufacturing operations. To estimate sewage needs, a 1.5 EDU/acre rate is used for wastewater flow projections with a maximum building coverage of 20%.

MR Medium Density Residential – The primary purpose of this district is to provide for townhouse and duplex residential dwellings. To estimate sewage needs, a 5.5 EDU/acre rate for this district have has been developed based on an average lot size of 2,500 SF with 40% of the gross land area reserved for non-lot uses such as right-of-way and open space.

RO Residential Office District - This district is designed to accommodate up-scale professional and business offices adjacent to and within residential areas. To estimate sewage needs, a 2.0 EDU/acre rate is used for wastewater flow projections based on a minimum lot size of 10,000 SF.

RP Residential & Professional District — This district is designed to accommodate small scale professional and business offices adjacent to and within residential areas. To estimate sewage needs a 3.5 EDU/acre rate is used for wastewater flow projections based on a maximum building coverage of 65%.

RR Retirement Residential – The primary purpose of this district is to provide for age restricted retirement residential dwellings. To estimate sewage needs, an 8.5 EDU/acre rate for this district has been developed based on 40% of the gross land area reserved for non-lot uses such as right-of-way and open space.

FP Floodplain Conservation District - The primary purpose of this district is to protect the floodplain areas of the Township and to encourage the retention of open space land uses. The district is utilized as an overlay district for all applicable locations in the Township. The district boundaries as delineated on the Floodplain Overlay Map of East Norriton Township were established by the Flood Insurance Study for the Township of East Norriton, Montgomery County, Pennsylvania, as prepared by the Federal Insurance Administration.

The zoning classifications and sewer and water needs are summarized as follows:

Zoning Classification	EDU/Gross Acre
AR	3.0
ARC	2.5
BP	11.0
BR	2.5
BR1	3.5
C	7.0
C1	8.0
EC	4.0
EC2	5.0
HR	16.0
I	2.5
IN	5.0
LI	1.5
MR	5.5
RO	2.0
RP	3.5
RR	8.5

1.04 Floodplain Protection Areas

The most significant floodplain areas and wetlands in East Norriton Township are those along the Stoney Creek and the East and West branches of the Stoney Creek, as shown on Figure 1-2 - "Natural Features Plan". Smaller floodplains parallel minor tributaries to these streams. East Norriton Township participates in the National Flood Insurance Program, and has enacted a floodplain ordinance to regulate the type and extent of development in flood-prone areas. While some development that occurred prior to these ordinances exist in the floodplain, there is an awareness of the dangers in this area, and new development is controlled in flood-prone land.

SECTION 2 - PHYSICAL AND DEMOGRAPHC CONDITIONS

2.01 Regional Location

East Norriton was established as a Second Class Township in 1924. Located in Montgomery County, and situated adjacent to the Borough of Norristown it comprises approximately 6.1 square miles. Adjacent communities include: Borough of Norristown to the south; Plymouth Township to the east; West Norriton Township to the west, Worcester Township to the west and north and Whitpain Township to the north.

2.02 Demographic Conditions

The most detailed characteristics of population and housing have been produced by the Bureau of the Census. These figures reflect the results of the decennial census, last compiled in 2000. According to the 2000 census data there are 13,211 residents in East Norriton Township, which represents a decrease of 0.8% since the 1990 population of 13,324.

Owner occupied housing units comprise approximately 77% of all housing in East Norriton Township and renter occupied housing units comprise approximately 23%. The average owner occupied household size in East Norriton Township is 2.63 persons per household, a drop of 0.11 from the 1990 figure of 2.74 persons per household. This is slightly less than the Montgomery County average of 2.74 persons per household for owner occupied units.

2.03 Demographic Projections

The Montgomery County Planning Commission (MCPC) has projected the total Township population over the next 25 years to be as follows:

YEAR	POPLUATION	CHANGE %
2000	13,211	
2005	13,620	+ 1.03%
2010	13,600	- 0.001%
2015	13,570	- 0.002%
2020	13,550	- 0.001%
2025	13,530	- 0.001%
2030	13,500	- 0.002%
	Overall 25 year change	- 0.009%

There are approximately 170 new single family residential units and 140 apartment or age restricted units planned in East Norriton Township. At 2.63 persons per household for owner occupied units and 1.84 persons per household for renter occupied units the total increase in the resident population is estimated at 705 persons. The number of residential units added from 1994 to 2005 is approximately 210 EDU's or 510 people. If all currently proposed development is completed by the next census in 2010, the projected increase in population would be approximately 2,400 people for a total of 15,611 people. Barring any significant slowing of the economy in the Township, the population can be expected to increase by 10% to 15% from 2000 rather than remain relatively stable as forecasted by the MCPC.

Most of the commercial areas within the Township are located along transportation corridors of Germantown Pike and DeKalb Pike. Industrial areas are located adjacent to the Stoney Creek Railway in the center of the Township and at the Southwest corner of the Township bounded by Germantown Pike, Foundry Road and Burnside Avenue.

2.04 Geologic Features

East Norriton Township is underlain by sedimentary and associated igneous rocks of Triassic Age which are part of the Newark Group. These rocks form a series of disconnected, down-faulted basins which extend from Nova Scotia to North Carolina. In southeastern Pennsylvania, the Triassic rocks have been divided into the Stockton, Lockatong and Brunswick Formations. Both the Stockton Formation and Lockatong Formation underlie portions of East Norriton Township.

The Stockton Formation is composed chiefly of very fine to course grained Arkosic sandstone and Arkosic conglomerates, inter—bedded red shale and siltstone. The Stockton Formation is divided into three (3) members which include the following: (1) Lower Arkose Member; (2) Middle Arkose Member; and (3) Upper Shale Member.

The Lockatong Formation lies beneath the Stockton Formation and consists of thick bedded argillite (very dense shale and mudstone). The Lockatong Formation is resistant to erosion and forms low ridges. Thinner beds of the Lockatong Formation are interbedded with the overlying Brunswick Formation. Plate IV from the 1992 Act 537 Sewage Facilities Plan (Appendix E) identifies the geology of East Norriton Township. The Lockatong Formation underlies the northeast and northwest portions of the Township. The Middle Arkose Member of the Stockton Formation underlies the greatest portion of the Township. The Upper Shale Member inter-beds the Arkose striking east to west across the Township.

2.05 Potable Water Resources

Surface water from the PA American Water Company is the sole source for public water supply in the East Norriton Township/ENPWJSA Area. The rural parts of the planning area are currently served by on-site wells. The source of water for the system is the Schuylkill River.

The existing potable water distribution system throughout East Norriton Township is shown on Figure 2-1.

2.06 Soils

The soils in East Norriton Township vary greatly in characteristics such as slope, depth, stoniness, and natural drainage. The Soil Survey of Montgomery County delineates four (4) soil associations in the Township. Each association, as a rule, contains a few major soils and several minor soils in a pattern that is characteristic but not uniform. Descriptions of these soil associations follows:

Abbottstown / Readington / Croton Association

Soils of the Abbottstown / Readington / Croton Association cover a small portion of the Township along the northeastern and northwestern boundaries. The soils of this association are formed from material weathered from shale and generally contain a moderate number of coarse fragments. The soils of the Abbottstown series are deep and somewhat poorly drained and mottling is common at a depth of 12 to 20 inches. The soils of the Readington series are deep and moderately well drained, mottling is common at a depth of 28 inches and soil permeability is moderately slow. The soils of the Croton series are deep, poorly drained with some mottling at 12 to 14 inches. Generally, the soils of this association have limitations for development because the slow permeability and shallow depth to mottling preventing onlot sewage disposal systems (OLDS) from operating efficiently.

Reaville / Penn / Klinesville Association

The soils of the Reaville / Penn / Klinesville Association occupy a small portion of the northeastern and northwestern sections of the Township. These soils are located on rolling

uplands. The soils of the Reaville series are moderately deep, moderately well drained containing 15% to 25% shale fragments in the 8" surface layer. These soils have a thin, slowly permeable subsoil restricting downward movement of water. The soils of the Penn series are moderately deep to shallow and have moderately rapid permeability with shallow depth to bedrock. The soils of the Klinesville series are located on steep slopes and on narrow ridge tops. They are well drained soils with shale fragments comprising 50% to 90% of the 10" thick surface layer and depth to bedrock is generally 12 to 18 inches.

The soils of this association have many limitations for land development. The most significant limitation is the variable nature of the soils characteristics. Their drainage ranges from good to poor; their slopes range from nearly level to steep; and the depth to bedrock ranges from 12 inches to more than 3 feet. The ability of these soils to properly treat effluent from septic tanks is limited because of the slow permeability of the subsoil or substratum in the Reaville soils, and the shallow depth to bedrock of the Penn and Klinesville soils.

Lawrenceville / Chalfont / Doylestown Association

The soils of the Lawrenceville / Chalfont / Doylestown Association are situated in the midsection of the Township. The principle soils in this association have formed a thick mantle of silt, deposited by wind. The soils of the Lawrenceville series are deep, moderately well drained with some mottling common in the lower part of the subsoil. The soils of the Chalfont series are located on the lower lying valleys. They are deep, somewhat poorly drained and have very slow permeability in the subsoil restricting downward movement of water. The soils of the Doylestown series are deep, poorly drained with a thick, slowly permeable subsoil restricting downward movement of water. The soils of this association have limitations for land development since they experience severe erosion after the soils are disturbed. The low permeability of these soils represent a limitation for on-lot disposal of wastewater.

Lansdale / Penn Association

The soils of the Lansdale / Penn Association underlie a large part of the eastern section of the Township. The soils of the Lansdale series are moderately deep, well drained with a sandy subsoil generally 3 feet thick. The soils of the Penn series are moderately deep to shallow and moderately rapid permeability. The soils of this association have moderate limitations for land development. The main limitations are steep eroded slopes and shallow depth to bedrock. Although some of the soils have moderately slow permeability in the subsoil, these soils are moderately suitable for onlot disposal of wastewater.

Soil Suitability for On-Site Sewage Disposal

The suitability of the planning area soils for subsurface, on-site sewage disposal systems varies with location, soil type and soil characteristics. Soil geologic characteristics can change abruptly, sometimes varying within a foot. Site soil permeability and depth to the limiting zone must be determined by site investigation to determine final soil suitability because of the shale and sandstone geology of the region. Figure 1-2 indicates the areas where the soil type has limitations for on-lot disposal systems to operate efficiently.

On-Lot Disposal Systems (OLDS), which are of proven technologies, can be classified as individual or community systems:

Individual Sewage Systems

According to PA Code Title 25, Chapter 81, 7.1.1(l) individual sewage systems are defined as "...a system of piping, tanks or other facilities serving a single lot and collecting and disposing of sewage in whole or in part into the soil or waters of this Commonwealth or by means of conveyance to another site for final disposal." Under this broad definition, there are

several means of accomplishing the necessary treatment and disposal which include Individual On-Lot Sewage System(s) and Individual Sewerage System(s).

Individual On-Lot Sewage Systems - Chapter 73 of Act 537 PA Code Title 25 defines those systems which are considered for standard use permitting for individual on-lot sewage disposal.

Soil based disposal of sewage effluent requires certain criteria within the subsurface profile be met. For various technologies, certain limiting factors (zones) must not be encountered to a specified depth. These criteria vary based on the technology to be applied and are generally as follows:

- Inground systems require a minimum of 60 inches to a limiting zone, and a suitable percolation rate.
- Elevated Sand Mounds require 20 inches to a limiting condition as well as a passing rate of percolation.
- Individual Residential Spray Irrigation (IRSIS) necessitates at least 10 inches to the presence, or indications of a high water table or zone of seasonal saturation. A minimum of 16 inches to rock is necessary for IRSIS as well.
- Drip Irrigation On-Lot Disposal Systems require 20 inches to a limiting condition similar to sand mound systems, however, the Drip Irrigation System utilizes an advanced filter or aerobic treatment unit, which precludes the use of a large sand mound.
- Retaining tanks have no specified restriction based on soil conditions.

Individual Sewerage Systems - This type is a form of disposal other than methods which apply soil renovation or retaining tanks. Such methods typically apply high levels of treatment followed by direct discharge to Waters of the Commonwealth or the surface of the ground. Each residence might be equipped with an individual mechanical treatment and disinfection facility discharging to any available point, stream, swale, ditch, etc.

Community Sewage Systems

PA Code Title 25, Chapter 71, 781.1.1(ii) define a community sewage system as "a sewage facility, whether publicly or privately owned, for the collection of sewage from two or more lots... ". This differs from Individual Sewage Systems in that more than one dwelling, or equivalent dwelling unit, is serviced by one system. Final treatment and disposal can also occur on any lot(s), or in a separate location entirely. These types of systems can be distinguished as Community On-Lot Sewage System(s) and Community Sewerage System(s).

Community On-Lot Sewerage Systems, as with Individual On-Lot Systems, must comply with various soil criteria to accommodate the use of certain accepted technologies. Generally, due to the volume of sewage flows, a hydrogeologic analysis and more extensive soils testing is required by the Pennsylvania Department of Environmental Protection (PaDEP). Due to PaDEP acting as the permitting entity for these community systems which exceed 10,000 gallons per day, Chapter 73 is utilized as a guidance rather than strictly governing the testing and design processes.

Technologies that are commonly accepted for Community on-lot disposal include, in-ground absorption areas, elevated sand mound(s), spray irrigation of treated effluent to the surface of the ground, drip irrigation and rapid infiltration through overland flow or basin absorption.

Community Sewerage Systems - These systems can be publicly or privately owned facilities which treat and dispose of sewage other than through soil renovation or retaining tanks. These methods include large scale conveyance and treatment facilities or site specific collection and treatment facilities. Following treatment, the effluent is discharged to the Waters

of the Commonwealth. Currently there are no community on-lot disposal systems located within East Norriton Township.

Retaining tanks as a method of long term sewage disposal, either for individual lots, or on a community-wide basis, are not acceptable. Retaining tanks can accommodate the most challenging site conditions, but are maintenance intensive and prone to malfunction due to overloading or inappropriate pumping schedules. Therefore, this method is an unfeasible alternative, as a long term method.

Individual on-lot sewage disposal via elevated sand mounds or drip irrigation systems are options for the areas designated for on-lot disposal systems as shown on Figure 3-2. Based on the general soil type characteristics, land in these areas meet the minimum limiting zone requirement; however, other conditions such as slope, slowly permeable layers (fragipans), and proximity to property boundaries may inhibit successful percolation or permeability testing. An on-lot disposal system utilizing an elevated sand mound was installed at 550 North Trooper Road and a drip irrigation system was installed at 912 North Trooper Road (see the October 25, 2005 letter from the MCHD in Appendix D).

Individual Residential Spray Irrigation System (IRSIS) generally requires a lot size of at least three acres. To accommodate the Township's desire for open space preservation, and reasonably utilize the properties zoning potential, IRSIS is not a feasible approach.

Drip Irrigation On-Lot Disposal Systems have recently been approved by the PaDEP for use on individual on-lot systems. These systems require 20 inches to a limiting condition similar to sand mound systems, however, the Drip Irrigation System utilizes an advanced filter

tank of sand or peat to complete the biological stabilization of the waste. An alternative to the filter tank is the use of an aerobic treatment tank. The effluent from the filter tank or aerobic tank is collected in a hydraulic pump tank which is sized to deliver the proper rate of liquid waste to one of two drip irrigation zones, which generally consist of ½" diameter tubing placed 6" to 12" deep. The pump unit and delivery system are designed to automatically alternate the dosing between the two irrigation zones. The lateral tubing consists of emitters which deliver the waste at a rate of 0.34 gallons per lineal foot utilizing a pressurized system, which has in-line filters to prevent clogging of the emitter ports. The advantage of this system compared to the elevated sand mound system is that a large volume of soil or sand is not required. However, the disadvantage is the need to replace the sand or peat in the filter unit and higher more frequent operating and maintenance inspections to maintain the pump and in-line filters.

SECTION 3 - EXISTING SEWAGE FACILITIES

3.01 Gravity Collection and Interceptors

The existing sanitary sewers in East Norriton Township consist of approximately 58 miles of pipes ranging from 8 inches to 24 inches in diameter. Figure 3-1 shows existing sanitary collection and conveyance sewers, pumping stations, drainage basins and force mains.

The Germantown Avenue Pump Station located adjacent to the West Branch of the Stony Creek at Germantown Pike collects sewage from the northwestern section of the Township up to the Worcester Township border. The station, upgraded in 1997, consists of three (3) vertically mounted, centrifugal, dry well pumps, with an existing station capacity of 2.9 mgd. The station discharges flow through a 4,900 feet 12 inch force main, which conveys sewage to the sanitary sewer system along Germantown Pike and eventually to the Timberlake Pump Station.

The Timberlake Pump Station, located adjacent to the Stony Creek and the Briar Glenn Apartments, was upgraded in 1997. The station consists of three (3) vertically mounted, centrifugal, dry well pumps, with an existing station capacity of 4.0 mgd. The station discharges flow through a 2,130 feet 12 inch force main, which conveys sewage to the sanitary sewer system in Stanbridge Street and eventually to the Norris City Avenue Pump Station.

The Norris City Avenue Pump Station is located adjacent to the East Branch of the Stony Creek at the southeastern section of the Township. The station consists of three (3) horizontally mounted, centrifugal, dry well pumps, with an existing station capacity of 7.5 mgd. The station discharges flow through a 3,505 feet 16 inch force main to a gravity sewer in

Hartranft Avenue. The discharge from this station along with the gravity flows from the southeastern section of the East Norriton Township, adjacent to Plymouth Township, are conveyed to the Sawmill Pump Station, which is owned and operated by the East Norriton Plymouth Whitpain Joint Sewer Authority (ENPWJSA).

The Sandra Lane Pump Station is located at Sandra Lane and Whitehall Road. The station collects sewage from the western central section of the Township generally parallel to Whitehall Road. The station was replaced in 2003 and consists of two (2) submersible wet well pumps, with an existing station capacity of 0.50 mgd. The station discharges flow through a 1,900 feet 6 inch force main, which conveys sewage to the sanitary sewer system along Germantown Pike and eventually into the Germantown Pump Station.

The Burnside Avenue Pump Station is located on Potshop Lane near Burnside Avenue. The station collects sewage from the western corner of East Norriton Township adjacent to West Norriton Township. The station consists of two (2) submersible wet well pumps, with an existing station capacity of 0.22 mgd. The station discharges flow through a 1,500 feet 6 inch force main, which conveys sewage to the sanitary sewer system along Germantown Pike and eventually into the Germantown Pump Station.

The Shultz Road Pump Station is located on Shultz Road near Singer Lane. The station collects sewage from the northwestern corner of East Norriton Township adjacent to West Norriton Township. The station consists of two (2), submersible wet well pumps, with an existing station capacity of 0.14 mgd. The station discharges flow through a 1,850 feet 4 inch force main, which conveys sewage to the sanitary sewer system along Woodland Drive and eventually into the Germantown Pump Station.

The Whitehall Road Pump Station is located on Whitehall Road at Township Line Road. The station collects sewage from the north central section of East Norriton Township adjacent to Worcester Norriton Township. The station consists of two (2) submersible wet well pumps, with an existing station capacity of 0.07 mgd. The station discharges flow through a 1,100 feet 4 inch force main, which conveys sewage to the sanitary sewer system along Township Line Road and eventually into the Timberlake Pump Station.

The Felton Road Pump Station is an ejector pumping station that serves the northern area of Felton Road. The station pumps to a gravity sewer on Felton Road via a 500 feet 4 inch diameter force main.

The Marion Avenue Pump Station serves properties located on Marion Avenue. This grinder pump station pumps to a gravity sewer on Whitehall Road via a 1,000 feet 2 inch diameter force main.

Expansion of the collection system is occurring in areas of development, with new collection sewer construction by private developers and landowners.

East Norriton Township has wastewater treatment capacity at the ENPWJSA Wastewater Treatment Facility. The facility is located in the southwestern corner of Plymouth Township adjacent to the Schuylkill River. It is owned and operated by the ENPWJSA Authority. The ENPWJSA Wastewater Treatment Plant is authorized to discharge to the Schuylkill River under the NPDES Sewage Permit No. PA0026816. The plant presently provides advanced secondary treatment levels through the use two (2) types of treatment

processes consisting of trickling filtration and activated sludge. East Norriton Township's present allocated capacity at the ENPWJSA is 2.7 mgd (annual average) and 3.1 mgd (maximum monthly).

The ENPWJSA Wastewater Treatment Plant has a permitted maximum monthly discharge capacity of 9.3 million gallons per day (mgd) with an annual average flow rating of 8.1 mgd. The 2004 annual average daily flow was 6.45 mgd and the maximum monthly flow was 7.75 mgd. A review of the ENPWJSA Chapter 94 (2004) report projects that the treatment plant will operate within permitted limits for the next 5 years. The ENPWJSA is presently investigating a facility upgrade and expansion to address more stringent discharge limits and to accommodate additional sewage contributions. Various expansion scenarios are under consideration. A 2003 upgrade/expansion scenario considered a capacity increase to an annual average flow of 8.7 mgd with a maximum monthly capacity of 11.1 mgd. Based on capacity being apportioned equally between the three townships, East Norriton Township would realize an annual average capacity of 2.9 mgd and a maximum monthly capacity of 3.7 mgd. The estimated 2003 cost for the ENPWJSA conceptual upgrade/expansion is expected to range from $10.8 million to $12.6 million. When soft costs at 15% are included, the total project cost would approach about $14.5 million. When shared equally by the three municipalities, East Norriton Township's share would be about $4.8 million.

3.02 On Lot Disposal Systems (OLDS)

There are 209 existing parcels in East Norriton Township utilizing on-lot sewage disposal systems, as summarized in Table 3-1. The Act 537 Plan Update anticipates 170 on-lot systems being connected to the public sewer system leaving 39 on-lot systems in service. These

remaining on-lot systems are located in the western section of the Township in the Trooper Road and Township Line Road area.

3.03 Septage Generation and Disposal

Telephone inquiries were conducted with local septage collection and disposal companies which are located in the East Norriton Township service area. There are three companies which regularly serve properties in the Township on a weekly basis. Accurate records of septage generation in the Township were not available from septage haulers. An average quantity of septage collected from the three companies ranges from 5,000 to 10,000 gallons per quarter. All three companies indicated that they dispose of septage primarily at the Valley Forge Treatment Plant.

3.04 Water Well Testing

The Montgomery County Health Department (MCHD) was requested to research their records regarding water samples obtained from private properties located in East Norriton Township. As of the date of this plan no reports have been submitted by the MCHD.

3.05 OLDS Management

MCHD reported in their October 28, 2003 and October 25, 2005 letters (see Appendix D) that there were 8 complaints investigated for possible malfunctions of existing systems. Corrective action was competed on all noted systems. There were 7 active site investigations conducted by the MCHD. The location of these fifteen (15) sites is shown on Figure 3-1. The MCHD reported that 6 of the 7 site investigations have not been satisfactorily resolved and no further action was taken. All 6 parcels have been identified to be connected into the public sanitary sewer system in the future. In their October 25, 2005 MCHD identified 5 parcels that

have been issued permits for the repair or replacement of an existing system or the installation of a new system.

Although there are problem areas in East Norriton Township and while the MCHD is currently responsible for permitting of new systems and resolution of complaints and problems, the Township does recognize its responsibilities to prevent possible detrimental health impacts to the public by improper operation and maintenance of OLDS. To this extent, the Township will continue their OLDS inventory system and community education program which provides current best management practice information to all property owners which have an existing OLDS. Technical questions have been directed to either the MCHD or the PaDEP.

3.06 Inflow & Infiltration Flow Monitoring

A part of the Act 537 Sewage Facilities Planning Report update is the investigation of the sanitary sewer collection system to identify and prioritize drainage areas which exhibit extraneous inflow and/or infiltration. The flow monitoring study was conducted throughout the Township utilizing portable meters installed in manholes which segregated several specific drainage areas. The flow monitoring has resulted in inflow & infiltration rehabilitation, which is discussed in Section 5.

SECTION 4 - FUTURE GROWTH AND DEVELOPMENT

4.01 Growth Area

The growth areas proposed for this update of the East Norriton Township Act 537 Sewage Facilities Plan include all tracts of land not currently served by public sewers in all zoning districts. A review of the zoning and the draft Comprehensive Plan Update were used as guidance in establishing the forecast of growth.

Table 4-1 provides a tabulation of EDUs that have been purchased for proposed and existing land developments throughout the Township. The general acceptability of the major soils in the non-growth areas to OLDS was also reviewed for consistency. The existing sewered areas and the sewer growth areas are indicated on Figure 3-2 (Act 537 Sewer Facilities & Growth Areas). To determine the potential sewage flow from the growth area, the total acreage of developable land was estimated and classified by zoning district. The growth area acres for each applicable zoning district in each of the four major pump station drainage basins was multiplied by an average EDU/acre rate, based on current zoning, to determine the number of potential additional EDUs needed to serve the growth area. The total potential EDUs required to serve the growth area is estimated at 1,856 EDUs (0.510 mgd), as shown on Table 4-1. The anticipated growth for each major pump station drainage basin is as follows:

Area	EDU	Flow
Germantown Pump Station Drainage Basin Area	1,034	0.284 mgd
Timberlake Pump Station Drainage Basin Area	203	0.056 mgd
Norris City Pump Station Drainage Basin Area	324	0.089 mgd
Sawmill Pump Station Drainage Basin Area	295	0.081 mgd
Totals	1,856	0.510 mgd

A consistency review with the Montgomery County Facilities Plan and Land Use Plan was conducted. The growth areas for public sanitary sewage within the Township are not consistent with the Montgomery County Facilities and Land Use plans. The area at the northwest corner of the Township is indicated to be connected to public sanitary sewers. This update proposes to maintain the sanitary disposal method for these properties as on-lot disposal systems in the Trooper Road and Township Line Road area.

SECTION 5 - PLANNING AND FACILITIES ALTERNATIVES, TREATMENT FACILITIES, EVALUATION AND RECOMMENDATION

5.01 Collection, Conveyance and Treatment

Growth areas which develop are expected to connect to public sewers within the next 10 years are indicated on Figure 3-2. Parcels which are planned for ultimate connection to the public sanitary sewer system are also indicated on Figure 3-2. Areas not identified as being served by public sewers on the map are planned to be served by on-site systems. The growth areas are consistent with the Township's comprehensive plan and the Township zoning map.

The ongoing sanitary sewer collection and conveyance system maintenance program consists of several activities. The major projects include:

Sewer Line Reconstruction and Replacement

East Norriton Township has completed several I/I rehabilitation repairs to existing sewer lines utilizing remote controlled re-lining of sewers and excavated replacement. The following is a summary of recent projects:

- Performed twenty-seven (27) spot repairs of 8" sewer main from six (6) feet in length to fourteen (14') feet in length.
- Slip lined approximately 620 LF of 8" sewer on Lawton Road.
- Slip lined approximately 350 LF of 8" sewer on Fourth Avenue.
- Slip lined approximately 450 LF of 8" sewer at the East Norriton Middle School.
- Installed approximately 400 plastic inserts in manholes to capture inflow.
- Replaced approximately 480 LF of 10' interceptor at the East Norriton shopping center.
- Replaced approximately 150 LF of 8" sewer in Butcher's Mill Road.
- Replaced approximately 250 LF of 15" interceptor between MH Nos. 88 and 87.

- Approximately 120 LF of 8" sewer main and 100 LF of 12" interceptor was replaced during the construction of the McDonald's and MRA Carwash projects.
- Approximately 250 LF of 8" sewer was replaced at the Mercy Suburban Hospital.

Collection Line Televising and Grouting

Work during the 1990's included the internal televising inspection of approximately 264,000 feet of sewers, testing of 54,000 joints, sealing of 35,000 joints utilizing 36,000 gallons of chemical grout. In 1998 the Township adopted more stringent standards for sanitary sewer construction. Also, the Township purchased a remotely controlled closed circuit camera system and high pressure hydraulic sewer cleaner truck to continue internal inspection of sewer mains by Township personnel.

Sewage Flow Metering

East Norriton Township utilizes flow meters at the Germantown, Timberlake, Norris City and Sandra Lane Pumping Stations which records all flows. In addition to these meters, the Township has utilized portable open channel flow meters for installation at various locations in the Township sewer system. During 2003 and 2004 the Township placed meters in several key locations in the Germantown and Sandra Lane Pump Station Drainage Areas to identify and prioritize the sections of each area exhibiting the most severe infiltration and inflow problems. Several letters from ARRO Consulting, Inc. regarding the progress of the investigation are included in Appendix F1. The Germantown Pump Station Area was subdivided into eight (8) sub-drainage basins, as shown in Appendix F2, which had open channel flow meters installed to simultaneously record flows during an eight week period. Sewer flows during dry and wet weather periods were recorded and evaluated to determine the sub-areas with the highest I/I problems. The results of the flow monitoring of these areas is included in Appendix F2. Three (3) of the sub-basin areas were identified with the highest I/I

rates, contributing an estimated two-thirds of the total I/I flows entering the Germantown Pump Station. More extensive investigation of the sanitary sewer mains within this area included manhole inspections, storm sewer cross connection investigations, smoke and dye testing and sump pump connection inspections. A comprehensive sewer main and lateral internal televising inspection work has concluded that the overall condition of sewer mains to be good, however, approximately 98% of the laterals have been observed with root intrusion, incomplete pipe connections, and cracked pipes visibly exhibiting ground water intrusion. Internal televising inspection of approximately 50% of these laterals has been completed. The locations and quantity of properties inspected are included in Appendix F3.

Unauthorized Connections to Sanitary Sewers

In March 2000 East Norriton Township adopted Ordinance No. 419 which established requirements for the control of storm water to prevent discharge from sump pumps, floor drains, roof downspouts and storm sewer pipes into the sanitary sewer system. Building sewer cleanout vents on several commercial properties were inspected and found to be located in parking areas, which allowed surface water to enter the collection system. These properties (Appendix F4 summary listing) were notified by mail to correct the deficiency.

Within the West End Investigation Area residential properties were inspected to determine the location of the discharge of sump pumps. Appendix F5 is a tabulation of 307 properties that were investigated. A form letter (sample in Appendix F6) was sent to those properties to which access to the interior of the home was not initially obtained.

Code Enforcement and Inspection

During code enforcement activities, Township inspectors have been looking for wastewater related problems such as illegally connected sump pumps and roof drains and sewer laterals in disrepair. A checklist (Appendix F7) is utilized to verify compliance with Township rules and regulations prior to the sale of a property with a structure. The question regarding illegal sump pump or down-spout connections to the sanitary sewer is included on the form for the inspector.

5.02 Corrective Action Plan

East Norriton Township has developed a Corrective Action Plan (CAP) to address the I/I situation. The plan discusses the recent and proposed efforts of the Township to reduce I/I contributions into the sanitary sewer system. The portion of the system located in the western side of the Township includes the Germantown Pump Station Drainage Area, which has been identified as having the highest rate of extraneous I/I flows. The Corrective Action Plan states that for every ten (10) gallons per day (gpd) of documented I/I flows removed from the system one (1) gpd of connected flow would be available for new sewer connections. The proposed activities of the Corrective Action Plan are as follows:

1 The Township will complete sewer lateral televising within the noted subdrainage areas upstream of the Germantown Pumping Station. Concurrent with this fieldwork, the Township will develop specifications and bid a lateral repair and replacement project for the affected area.

2. The Township will prepare and pass an amendment to the existing ordinances requiring that when a property within the Township is sold the sewer lateral will be televised to determine condition. If a lateral is in unacceptable condition, the lateral will need to be replace or repaired prior to the completion of the sale.

3. The Township wastewater engineer will undertake a hydraulic analysis in connection with removing flow from the Germantown Pumping Station drainage area by redirecting that flow from the Sandra Lane Pumping Station directly to the larger Timberlake Pumping Station. This will assist in reducing surcharges and overflows at the Germantown Pumping Station.

5.02 Alternate Evaluation

Based on the present availability of treatment capacity for East Norriton Township at the ENPWJSA Treatment Facility and the Authority's present efforts to upgrade and expand the facility, an extensive investigation of treatment alternatives was not undertaken. Three alternates were considered:

- Continued Sewage Treatment at the ENPWJSA facility and participation in the upgrade/expansion.
- Diversion of Flow to West Norriton Township and treatment at a proposed facility to be constructed.
- No Action

Continued Sewage Treatment at the ENPWJSA

East Norriton Township's current average annual capacity of 2.7 mgd provides for sufficient sewage treatment capacity for the projected ultimate build out of the Township. The maximum monthly flow is anticipated to be 3.3 mgd based on the average annual daily flow rate of 2.7 mgd and a peaking factor of 1.32. The estimated additional maximum monthly capacity required by East Norriton Township at the ENPWJSA is 0.2 mgd greater than the present 3.1 mgd allocated capacity. With the proposed ENPWJSA facility 2003 conceptual scenario upgrade/expansion to an annual average flow capacity of 8.7 mgd (East Norriton capacity 2.9 mgd) and a maximum monthly flow capacity to 11.1 mgd (East Norriton capacity 3.7 mgd) adequate annual average and maximum monthly capacity will be available to accommodate future projected sewage contributions from East Norriton Township. The 2003 cost for East Norriton Township's share of the 2003 conceptual scenario upgrade/expansion is estimated at $4.8 million.

Diversion of Flow to West Norriton Township

West Norriton Township has inquired whether East Norriton Township would be interested in acquiring sewage capacity from West Norriton Township. This alternative would require the diversion of existing and future flows from the Sandra Lane and Burnside Avenue pump stations to West Norriton Township. An estimated average annual present and future flow of 0.2 mgd from these areas could be diverted to West Norriton Township's proposed Barbadoes Wastewater Treatment Facility. The estimated cost per gallon at the West Norriton facility is $ 7 per gallon for a 3.0 mgd plant (Appendix C). For 0.2 mgd of treatment capacity the East Norriton Township cost would be about $1.4 million. When the cost to construct conveyance facilities to divert sewage to West Norriton Township, estimated to be at least $0.2 million, is considered the total expected capital cost would be at least $1.6 million.

Presently it is proposed the ENPWJSA upgrade/expansion cost be shared equally between the three participating township's. Therefore if East Norriton Township were to divert flow to West Norriton Township to obtain an additional 0.2 mgd of capacity at the ENPWJSA facility the total cost would be $6.4 million ($4.8 million plus $1.6 million = $6.4 million). Since the proposed upgrade/expansion at the ENPWJSA facility would provide East Norriton Township adequate annual average and maximum monthly capacity to accommodate projected future sewage contributions, purchasing additional capacity from West Norriton Township is not necessary and is not economically justified.

No Action

The no action alternative would include East Norriton Township not participating in the ENPWJSA plant expansion to secure additional maximum monthly capacity at the facility. If East Norriton Township would be able to sufficiently reduce the I/I flows entering the collection

system, the additional 0.2 mgd of maximum monthly capacity may not be required. However, in accordance with the existing inter-municipal agreement it would still be necessary for East Norriton Township to participate in the plant upgrade associated with improving the organic treatment efficiency to meet the revised stream discharge limits.

Historically the permanent removal of I/I has been difficult. I/I removal has been documented in many municipalities only to be recorded in sewer reaches that were not rehabilitated. East Norriton Township's previous I/I rehabilitation efforts have been successful only to have I/I reappear as demonstrated by observed surcharges in the Germantown Pump Station area. Therefore since the Township will be involved with the plant upgrade the dual approach of securing additional maximum monthly treatment capacity at the ENPWJSA facility as well as aggressively pursuing I/I removal would seem to be the prudent approach to avoid the potential of a building moratorium due to the lack of maximum monthly capacity.

Recommended Alternative

It is recommended East Norriton Township participate in the ENPWJSA upgrade/expansion pursuant to the existing inter-municipal agreement. The 2003 cost share for East Norriton is estimated at about $4.8 million. Based on a 2.7 mgd annual average flow and 275 gpd/EDU, the calculated capital cost per EDU is $500/EDU ($4.8M/2.7mgd x 275gpd/EDU = $488.89/EDU, rounded $500/EDU). In addition I/I rehabilitation efforts should be continued as well as the management of on-lot sewage disposal systems. An outline of the recommended alternate follows:

1) Participate in the ENPWJSA wastewater treatment upgrade/expansion.
2) Continue to implement the Corrective Action Plan (CAP).
3) Continue the I/I program of monitoring, investigation and remediation.

4) Continue investigation of alternatives to reducing the peak flows at the Germantown and Sandra Lane Pumping Stations.

5) Continue to implement the Township's OLDS Management program.

6) Secure financing for the Township's share of the ENPWJSA upgrade/expansion costs.

SECTION 6 - INSTITUTIONAL EVALUATION AND RECOMMENDED ALTERNATIVE

6.01 East Norriton Township Organization

The ENPWJSA owns and maintains the wastewater treatment plant. The collection and conveyance systems in the Township are owned and maintained by the East Norriton Township.

6.02 Township Structure

East Norriton Township is in good financial standing. The East Norriton Township has a bonded debt which includes the Series 2002 and Series 2004 Guaranteed General Obligation Bonds which were the refinancing of prior general sewer revenue bonds and a Series 2003 Sewer Revenue Note. The Series 2002 bonds issued for $1,552,000 (of which 20.77% or $332,350 is related to sanitary sewer expenses) will mature in 2014. The Series 2004 bonds issued for $4,905,000 (of which 66.95% or $3,283,898 is related to sanitary sewer expenses) will mature in 2017. The Series 2003 note issued for $1,000,000 will mature in 2013. The proceeds of the Series 2002 bonds, the Series 2004 bonds and the Series 2003 note were invested. Annual operating expenses, exclusive of depreciation, totaled $2,763,000 for 2004. Revenues from user charges and connection fees totaled $2,276,000 in 2004.

The Township's public works department provides the staffing and resources for the maintenance of the conveyance and collection systems. Operation, maintenance, inspection and testing of the sanitary sewer system is conducted by East Norriton Township through the Public Works Department.

East Norriton Township has the existing legal authority to revise the Act 537 Plan. East Norriton Township has the legal authority to set rates and user fees through rules and regulations. East Norriton Township has the existing authority to take enforcement action for violations of adopted ordinances or regulations, negotiate agreement for wastewater treatment and raise capital for construction, operation and maintenance of the sewer system.

6.03 Institutional Alternatives

An update to the Township's Act 537 Plan has been prepared for East Norriton Township. Additional organizations or authorities will not be required to implement the revision. The ENPWJSA Treatment Facility provides the Township's treatment capacity through an Intermunicipal Sewage Treatment Agreement dated May 13, 1991.

6.04 Chosen Alternative

East Norriton Township has updated their Act 537 Plan in order to delineate sewer growth areas and the areas designated to use on-lot sewage disposal, to be consistent with the Township's Comprehensive Plan and zoning ordinances.

The Township should implement the Act 537 Plan Update and continue to monitor, investigate and remediate the sanitary collection and conveyance system to remove and prevent additional extraneous inflow/infiltration to ensure current permitted system capacities are not exceeded.

6.05 Administrative and Legal Activities

East Norriton Township has the legal authority to revise the Act 537 Plan with approval of the PaDEP. Prior to submission of the Act 537 Plan to PaDEP, East Norriton Township will

convene a public meeting after publishing a notice stating the purpose of the meeting, its date, time, and location to hear comments on the proposed plan. This notice is included in Appendix G. The proposed Act 537 Plan will also be forwarded to the Montgomery County Planning Commission (Appendix H), the Montgomery County Health Department (Appendix I) and the East Norriton Township Planning Commission (Appendix J) for review and comment.

East Norriton Township will, after consideration of all comments received by Montgomery County, Pennsylvania and Township agencies and the public, provide a written response which will be included with the Act 537 Plan in Appendix K.

The final adoption of the Act 537 Sewage Facilities Plan must be approved by resolution at a public meeting of the East Norriton Township Board of Supervisors. This resolution is included as Appendix L.

SECTION 7 - SELECTED TREATMENT AND INSTITUTIONAL ALTERNATIVES

7.01 Institutional and Technical Alternatives

East Norriton Township has sufficient annual average capacity at the ENPWJSA Wastewater Treatment Facility for the ultimate build out of the remaining land in the growth areas. Capacity is necessary to accommodate the projected future maximum monthly flow. Participation in the proposed ENPWJSA plant upgrade/expansion will provide East Norriton Township the necessary annual average and maximum monthly capacity to accommodate projected future sewage needs. Expansion of the sanitary collection system is anticipated by private developers for each tract of land. The existing pump stations and conveyance system have sufficient average annual flow capacity for the additional sewerage flows anticipated. Since the plan does not propose extending the existing sanitary sewer collection system by East Norriton Township, a request to review a construction area plan was not sent to the Pennsylvania Natural Diversity Inventory (PNDI) nor the Pennsylvania Historical and Museum Commission.

SECTION 8 - IMPLEMENTATION

8.01 Schedule of Implementation

East Norriton Township anticipates the current planned developments to be completed within the next 10 years. Major capital expenditures by the Township are not anticipated for the future sanitary sewer system expansion as developers will generally be required to extend sewers to serve their proposed projects.

East Norriton Township will participate on a one-third proportionate share of the upgrade and expansion of the ENPWJSA treatment facility. Based on a proposed expansion to 8.7 mgd at the ENPWJSA facility, East Norriton Township would acquire an additional 0.2 mgd of capacity for a total average annual capacity of 2.9 mgd and maximum monthly capacity of 3.7 mgd. The Township will follow the implementation schedule developed by the ENPWJSA in regards to the plant upgrade/expansion.

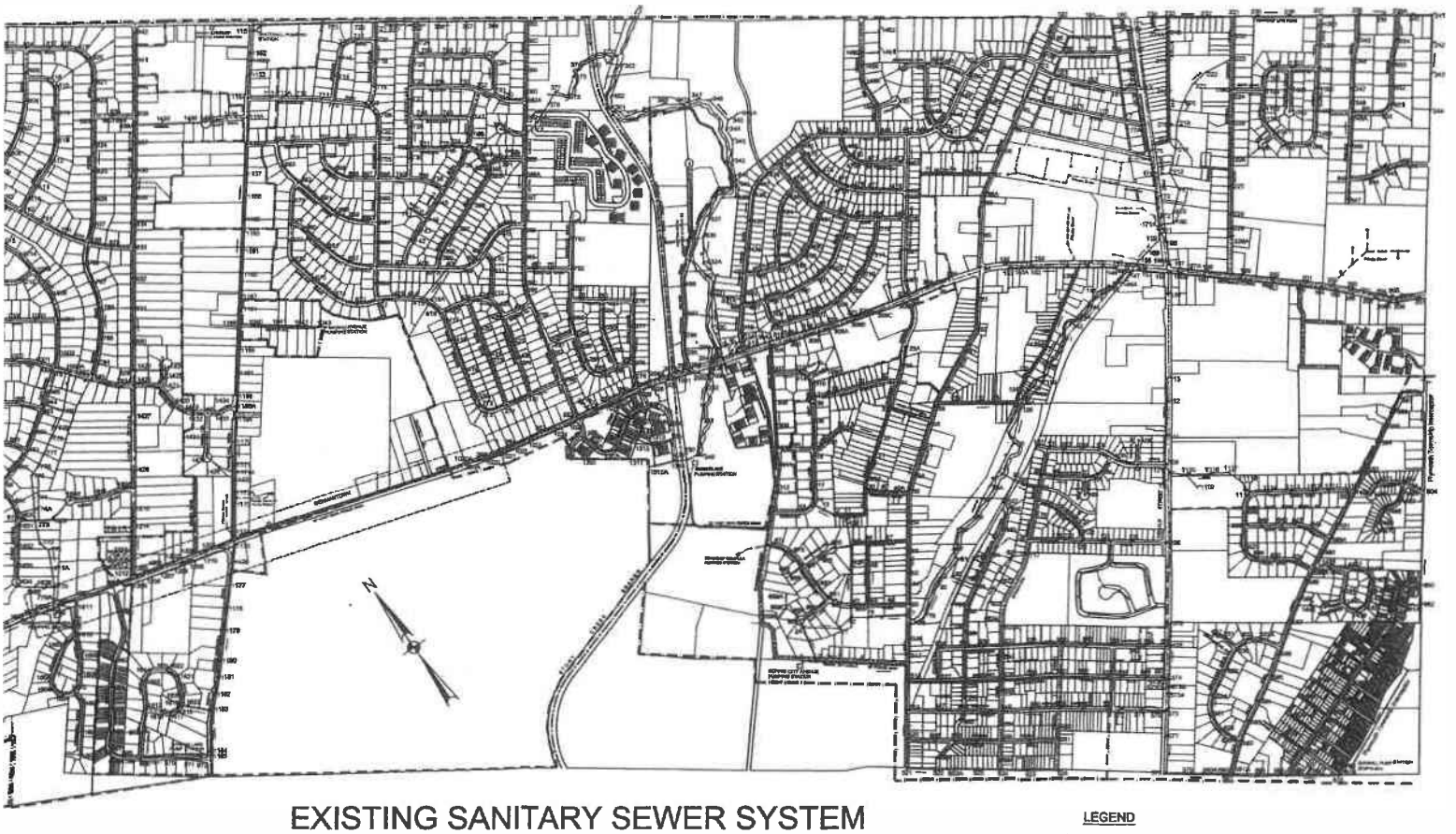
The proposed schedule for implementing the East Norriton Act 537 Plan Update follows:

No.	Task	Milestone
1	Submit Plan to Township for Review	December 2005
2	Finalize Draft Plan	January 2006
3	Advertise Plan for 30 day Public Comment Period	January 27, 2006
4	Forward Plan for Municipal Agency Reviews	January 27, 2006
5	Public Hearing to Review Plan and Receive Public Comments	February 28, 2006
6	60-Day Municipal/County Review Completion	March 29, 2006
7	Incorporate Public/Municipal/County Comments in Report*	April 18,2006
8	Issue Report for Municipal Adoption	April 18, 2006
9	Execute Municipal Adoption Resolution	April 18, 2006
10	Submit Act 537 Plan Update to PaDEP	April 19, 2006

No.	Task	Milestone
11	Forward Plan to ENPWJSA for incorporation into Authority Plan	April 2006
12	Receive PaDEP Approval	September 2006
13	Apply for Plan Preparation 50% Reimbursement	September 2006
14	Implement Plan Regarding Collection and Conveyance System	September 2006
15	Continue to participate in the ENPWJSA Act 537 Plan Update	2006-2007

*Note: If significant comments are received from municipal agencies, another 30 day public comment period would be appropriate.

FIGURE 3-1



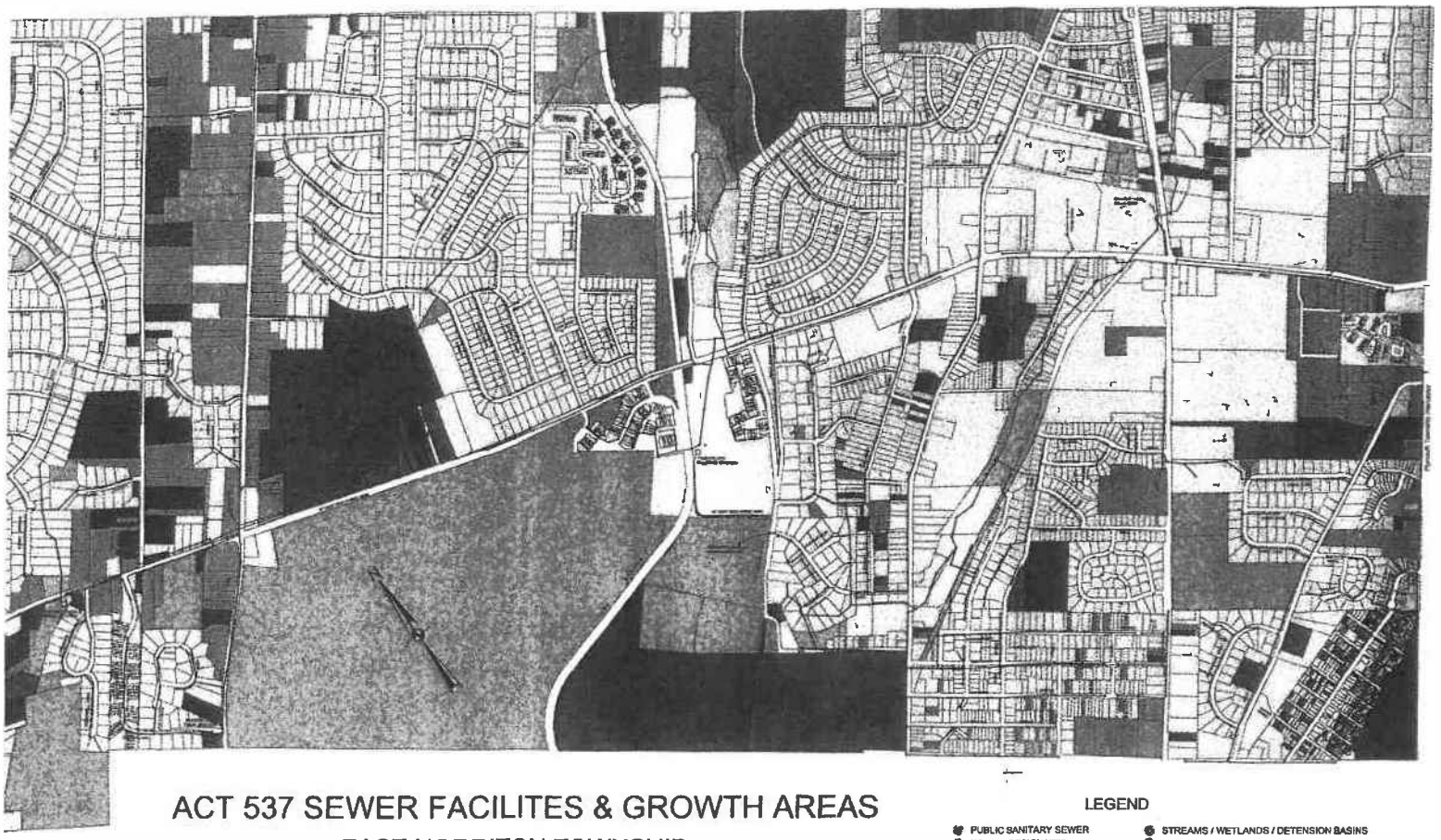
EXISTING SANITARY SEWER SYSTEM

EAST NORRITON TOWNSHIP
MONTGOMERY COUNTY, PENNSYLVANIA

LEGEND

- PUBLIC SANITARY SEWER
- PUBLIC SANITARY PUMP STATION
- FUTURE PUBLIC SANITARY SEWER
- PRIVATE SANITARY SEWER
- O.L.G.S. Investigation By MCHD
- PUMP STATION DRAINAGE BOUNDRY

NOVEMBER 2005



ACT 537 SEWER FACILITES & GROWTH AREAS

EAST NORRITON TOWNSHIP
MONTGOMERY COUNTY,PENNSYLVANIA

LEGEND

- PUBLIC SANITARY SEWER
- NO USE DESIGNATED
- MUNICIPAL / INSTITUTIONAL
- ON-LOT DISPOSAL SYSTEM
- FUTURE 10 YR PUBLIC SEWER
- FUTURE ULTIMATE PUBLIC SEWER
- OLDS TO PUBLIC SEWER
- STREAMS / WETLANDS / DETENSION BASINS
- PARKLANDS
- PERMANETLY PROTECTED
- TEMPORARILY PROTECTED
- PRIORITY I PRESERVATION
- PRIORITY II PRESERVATION
- PROPOSED DEVELOPMENT

NOVEMBER 2005

TABLES

TABLE 3-1

East Norriton Township
Existing On-Lot Disposal Systems

	OWNER	PARCEL_ADDRESS	Parcel Tax Map Identification
1	GIAIMO JOHN A & PHYLLIS S	2402 ALAN RD	Blk. 010 / Unit 012
2	FLY MARGARET T	2412 ALAN RD	Blk. 010 / Unit 027
3	MOON JAMES E. & ANN L.	322 BRISTOL ST	Blk. 031 / Unit 130
4	GRIFFIN JOSEPH F & CYNTHIA	512 BURNSIDE AVE	Blk. 003D / Unit 001
5	DETWILER WILLIAM H & HELEN D	532 BURNSIDE AVE	Blk. 003D / Unit 003
6	SIEGLE JOHN H 2ND & ESTHER V	530 BURNSIDE AVE	Blk. 003D / Unit 004
7	ROYDS RALPH W & ISABELLE A	536 BURNSIDE AVE	Blk. 003C / Unit 014
8	BEADLE HERBERT R & JEAN M	540 BURNSIDE AVE	Blk. 003C / Unit 013
9	WOLFROM ANNA R	546 BURNSIDE AVE	Blk. 003C / Unit 010
10	STRINGER HARRY & BARBARA T	548 BURNSIDE AVE	Blk. 003C / Unit 009
11	THE RAYMOND J GALULLO TRUST	550 BURNSIDE AVE	Blk. 003C / Unit 008
12	DETWILER & SIEGLE & O'NEILL & VANLA	520 BURNSIDE AVE	Blk. 003C / Unit 001
13	REIGNER RONALD	3208 BUTCHERS LN	Blk. 026 / Unit 024
14	CARBONE BRUNO M	90 CIRAK LANE	Blk. 002B / Unit 129
15	KAYNE PAUL S & LAURIE H	111 CIRAK AVE	Blk. 002B / Unit 016
16	ROBBINS JOSEPH E & JULIA M	109 CIRAK AVE	Blk. 002B / Unit 017
17	GORDON JAMES A JR & THERESA M	107 CIRAK AVE	Blk. 002B / Unit 018
18	ROBBINS BEATRICE D	105 CIRAK AVE	Blk. 002B / Unit 019
19	PETRILLO CARLO & MARIA	103 CIRAK AVE	Blk. 002B / Unit 020
20	ROACH JOHN H & KATHRYN M LIVING TRUST	101 CIRAK LN	Blk. 002B / Unit 021
21	SMITH STEVEN R & MARGARET D	108 CIRAK AVE	Blk. 002B / Unit 015
22	BARDAS RALPH F	106 CIRAK AVE	Blk. 002B / Unit 014
23	JORDAN JOHN P & GEORGEANN T	104 CIRAK AVE	Blk. 002B / Unit 013
24	CASSEL TROY	102 CIRAK LN	Blk. 002B / Unit 012
25	NUTTALL JOHN P & DORIS L	100 CIRAK AVE	Blk. 002B / Unit 011
26	BRADY WILLIAM P & DOLORES M	3200 DEKALB PK	Blk. 025 / Unit 014
27	CHOI SA H & KWUI R	2950 DEKALB PK	Blk. 026 / Unit 019
28	DELAURENTIS JOSEPH & JENNIFER	2008 DEKALB PK	Blk. 028 / Unit 003
29	GAMBONE GEORGE & JANE	2944 DEKALB PK	Blk. 026 / Unit 003
30	GAMBONE JAMES	3208 DEKALB PK	Blk. 025 / Unit 011
31	MAUL ELMER W & LEAH A	3002 DEKALB PK	Blk. 025 / Unit 022
32	DEGNAN JAMES H & MADELINE	2302 DEKALB PK	Blk. 028 / Unit 010
33	ROSS DANIEL M & PAULINE M	2231 DEKALB PK	Blk. 023 / Unit 044
34	GAMBONE SALVATORE & SUSAN	545 FOUNDRY RD	Blk. 002A / Unit 033
35	PROVIDENCE BUSINESS PARK,LLC	553 FOUNDRY RD	Blk. 002A / Unit 024
36	CROWLEYS MILK CO INC	550 FOUNDRY RD	Blk. 002A / Unit 025
37	VILARDO CHRISTINE	200 FRANCIS AVE	Blk. 021 / Unit 020
38	GAMBONE JOHN D	2927 HANNAH AVE	Blk. 026 / Unit 010
39	LEVINS ROBERT & STACEY	2931 HANNAH AVE	Blk. 026 / Unit 027
40	MIDDLETON JOHN MICHAEL &	2935 HANNAH AVE	Blk. 026 / Unit 035
41	YACOVELLI WILLIAM C & CHARLOTTE A	2957 HANNAH AVE	Blk. 026 / Unit 023
42	DIRADO RALPH C & JOAN A	2936 HANNAH AVE	Blk. 026 / Unit 142
43	STANSBERRY SYLVIA & IRMA	2933 HANNAH AVE	Blk. 026 / Unit 024
44	ALOIA JAMES T JR & KAREN J	2951 HANNAH AVE	Blk. 026 / Unit 025
45	WADSET LTD	549 INDUSTRY LN	Blk. 002 / Unit 043
46	MAXWELL JAMES & LEIDY BARBARA	11 JEFFERSON AVE	Blk. 012 / Unit 020
47	LEWSI JAMES J JR. & JANET	102 LAWNTON RD	Blk. 018A / Unit 116
48	NESTER EDWARD & HELEN	550 N TROOPER RD	Blk. 002A / Unit 005

TABLE 3-1

East Norriton Township
Existing On-Lot Disposal Systems

	OWNER	PARCEL_ADDRESS	Parcel Tax Map Identification
49	GEORGE MICHAEL & JODI	2022 N TROOPER RD	Blk. 001 / Unit 035
50	WHITE EDWARD R & BEVERLY J	2020 N TROOPER RD	Blk. 001 / Unit 034
51	KRAUS ADAM R & NICOLE M	2018 N TROOPER RD	Blk. 001 / Unit 033
52	SMITH THOMAS E & ROBERTA E	2016 N TROOPER RD	Blk. 001 / Unit 043
53	BECK GARY A & SUSAN A	2014 N TROOPER RD	Blk. 001 / Unit 032
54	PEEPLES ADAM & BARBARA	2012 N TROOPER RD	Blk. 001 / Unit 031
55	DeCICCO LAURA, JOSEPH N JR & MICHAEL A	2010 N TROOPER RD	Blk. 001 / Unit 030
56	BOSIO JEFFREY & LORI	1218 N TROOPER RD	Blk. 002B / Unit 030
57	CRAVEN WM J & RANDALL T	1216 N TROOPER RD	Blk. 002B / Unit 029
58	MURDOCK CELESTE M & JOHN E SORTOR	1214 N TROOPER RD	Blk. 002B / Unit 028
59	DEPAUL JOSEPH V & ANNA MARIE	1212 N TROOPER RD	Blk. 002B / Unit 027
60	LESHER FRANK M TRUSTEE	1206 N TROOPER RD	Blk. 002B / Unit 025
61	PAESANI DANIEL J & JANE SHARP	1210 N TROOPER RD	Blk. 002B / Unit 026
62	TAUGNER NICHOLAS W & WHITE MARILYN	1200 N TROOPER RD	Blk. 002B / Unit 022
63	LUBAR JASON E & CLARE L BILLETT-LUBAR	912 N TROOPER RD	Blk. 002A / Unit 010
64	HILLSINGER KEVIN D & DONNA R	906 N TROOPER RD	Blk. 002B / Unit 130
65	GUSZ ELIZABETH A	904 N TROOPER RD	Blk. 002B / Unit 131
66	LEPO JOSEPH F JR ROSALIE C	900 N TROOPER RD	Blk. 002B / Unit 100
67	MILLER LUKE	550 N TROOPER RD	Blk. 002A / Unit 005
68	ROSENBERGER ANGIE N & ROBERT P	546 N TROOPER RD	Blk. 002A / Unit 008
69	DELANEY WILLIAM & SUSAN	542 N TROOPER RD	Blk. 002A / Unit 009
70	BUCCI CARMEN A & ELEANOR	540 N TROOPER RD	Blk. 002A / Unit 010
71	J & J PROPERTIES	548 N TROOPER RD	Blk. 002A / Unit 007
72	GAMBONE JOHN	538 N TROOPER RD	Blk. 002A / Unit 011
73	PRESBYTERY OF PHILA TRUST	608 N TROOPER RD	Blk. 002A / Unit 002
74	BATEMAN JOHN G &	2024 N TROOPER RD	Blk. 001 / Unit 036
75	BIERMAAS KEVIN	3114 N WHITEHALL RD	Blk. 004D / Unit 025
76	WARDELL JOHNSON & MARIAN	3028 N WHITEHALL RD	Blk. 004D / Unit 028
77	120 CHURCH ROAD, LP	3029 N WHITEHALL RD	Blk. 004D / Unit 020
78	120 CHURCH ROAD, LP	3025 N WHITEHALL RD	Blk. 004D / Unit 009
79	WHITEHALL VENEZIP, LP c/o GAMBONE DEV. CO	3021 N WHITEHALL RD	Blk. 004D / Unit 010
80	PALLADINO DANIEL C & RUTH G	541 N WHITEHALL RD	Blk. 003A / Unit 011
81	MUGLIA ORESTE & BARBARA	527 N WHITEHALL RD	Blk. 003B / Unit 004
82	EGERTER FREDERICK G & JEAN C	523 N WHITEHALL RD	Blk. 003B / Unit 006
83	DUFFY JAMES F & ANNA M	3104 N WHITEHALL RD	Blk. 004D / Unit 026
84	FRANGIOSO SALVATORE G & BEVERLY ANN	2325 NEW HOPE ST	Blk. 027C / Unit 011
85	TOMCZAK RAYMOND & KATHLEEN	2323 NEW HOPE ST	Blk. 027C / Unit 027
86	DiCIURCIO RICHARD	2219-C NEW HOPE ST	Blk. 027B / Unit 019
87	MITCHELL JOHN F	3223 NOTTINGHAM RD	Blk. 004D / Unit 046
88	KRUSE WILLIAM F & LOIS CAROL	3222 NOTTINGHAM RD	Blk. 004D / Unit 045
89	GOLDBLATT MARSHA W & STEVEN G	3219 NOTTINGHAM RD	Blk. 004D / Unit 037
90	HUMAY EUGENE & JANE	507 OVERHILL RD	Blk. 010 / Unit 034
91	LAWRENCE CHRISTOPHER F & DIANE	3105 POTSHOP RD	Blk. 001 / Unit 008
92	PARKER BARBARA EDELMAN & JAMES	3120 POTSHOP RD	Blk. 003M / Unit 083
93	GILL QUARRIES INC	3201 POTSHOP RD	Blk. 001 / Unit 003
94	MERCANTE PHILIP J	3103 POTSHOP RD	Blk. 001 / Unit 060
95	CIPPERLY ALVIN R & YVONNE C	3107 POTSHOP RD	Blk. 001 / Unit 053
96	PERSEO ANTHONY P & MARISA C	3111 POTSHOP RD	Blk. 001 / Unit 051

TABLE 3-1

East Norriton Township
Existing On-Lot Disposal Systems

	OWNER	PARCEL_ADDRESS	Parcel Tax Map Identification
97	BROUSE FRANK W	2915 POTSHOP RD	Blk. 02B / Unit 008
98	BROUSE FREDERICK W & SALLY B	2917 POTSHOP RD	Blk. 02B / Unit 007
99	CORBO PETER A & HELENE M	2 RICHFIELD RD	Blk. 004 / Unit 038
100	WOODS GOLF CENTER INC	4 RICHFIELD RD	Blk. 004 / Unit 037
101	REESE ROBERT D & JOYCE N	1016 SCHULTZ RD	Blk. 001 / Unit 052
102	MILLER HARRY G & DWAYNE C MILER	1018 SCHULTZ RD	Blk. 001 / Unit 011
103	TUTURICE SALVATORE F & MARY G	1017 SCHULTZ RD	Blk. 001 / Unit 042
104	CAPPARELL JAMES V & MARY T	1021 SCHULTZ RD	Blk. 001 / Unit 017
105	ZIEMBICKI PAUL B & RUTH R	1023 SCHULTZ RD	Blk. 001 / Unit 018
106	NEVE JOS A & MAUREEN	1025 SCHULTZ RD	Blk. 001 / Unit 019
107	MCCLOSKEY JOSEPH E & BRENDA J	1027 SCHULTZ RD	Blk. 001 / Unit 020
108	SZCZEPKOWICZ VICTOR S & THERESA A	1029 SCHULTZ RD	Blk. 001 / Unit 021
109	MENDELSOHN JENNIFER	319 SHAMOKIN ST	Blk. 031 / Unit 106
110	CHRISTMAN REGINALD & NORMAN	331 SHAMOKIN ST	Blk. 031 / Unit 110
111	HEUR GEORGE W & SUSAN M	2400 STANBRIDGE ST	Blk. 005D / Unit 041
112	FALLEN JOSEPH & RENA	3105 SUNSET AVE	Blk. 003G / Unit 069
113	NAVE RALPH T & TANYA	3206 SUNSET AVE	Blk. 04D / Unit 048
114	PAOLUCCI JOHN & JOANNE	2900 SUNSET AVE	Blk. 004 / Unit 019
115	DEAN JAMES S & FRANCES H	2943 SUNSET AVE	Blk. 003F / Unit 010
116	ORDWAY ANTHONY, CECIL, FAY &	2941 SUNSET AVE	Blk. 003F / Unit 009
117	BAIRD NELSON M JR & IRENE	2939 SUNSET AVE	Blk. 003F / Unit 008
118	BAIRD HARRY L AS TRUSTEE - H BAIRD TRUST	2937 SUNSET AVE	Blk. 003F / Unit 007
119	HSU FU-CHUN & CHE-HSIANG WANG	2935 SUNSET AVE	Blk. 003F / Unit 006
120	TESTA CHAS J JR & CHRISTINE J	2933 SUNSET AVE	Blk. 003F / Unit 005
121	SMYTH WILLIAM J & JANET L	2931 SUNSET AVE	Blk. 003F / Unit 004
122	GOTTSHALL HOMER & LOIS W	2929 SUNSET AVE	Blk. 003F / Unit 003
123	SANTANGELO JAMES B &	2921 SUNSET AVE	Blk. 003F / Unit 001
124	SIRAVO MARK & AMIE	2917 SUNSET AVE	Blk. 003E / Unit 006
125	KEN-CREST HOUSING PA	2915 SUNSET AVE	Blk. 003E / Unit 008
126	MACDONALD JOSEPH & JANET L	2913 SUNSET AVE	Blk. 003E / Unit 008
127	BUTTERFIELD AMY J & JASON L	2907 SUNSET AVE	Blk. 003E / Unit 004
128	POWER MICHAEL F & SCHMIDT KIMBERLY	2905 SUNSET AVE	Blk. 003E / Unit 003
129	CROWLE BENJAMINI & DOREEN C	2903 SUNSET AVE	Blk. 003E / Unit 002
130	GRANESE GERARDO & ROSA & LIODORO I	3226 SUNSET AVE	Blk. 004D / Unit 011
131	HAND & HARMAN TUBE CO INC	SUNSET AVE	Blk. 004D / Unit 003
132	CHILSON PATRICK	3216 SUNSET AVE	Blk. 004D / Unit 013
133	KORKUS ANDREW J & MICHELE GALANTI	3214 SUNSET AVE	Blk. 004D / Unit 014
134	KLINE JAMES BRADFORD & KRISTY P	3210 SUNSET AVE	Blk. 004D / Unit 016
135	MASTROCOLA ROBERTO	3212 SUNSET AVE	Blk. 004D / Unit 015
136	SHOULBERG RICHARD W & MARY LOU	3208 SUNSET AVE	Blk. 004D / Unit 049
137	SCHMITZ WILLIAM J JR & JOAN M	3202 SUNSET AVE	Blk. 004D / Unit 017
138	O'CONNOR THOMAS S & JULIE ANN	3200 SUNSET AVE	Blk. 004D / Unit 018
139	IANACONE JOHN J & CYNTHIA D'AMBROSI	3176 SUNSET AVE	Blk. 004D / Unit 056
140	MANUOLA COLLEEN	3174 SUNSET AVE	Blk. 004D / Unit 057
141	HOUSEAL GEORGE I & JANET R	3170 SUNSET AVE	Blk. 004 / Unit 001
142	DIGIOVANNANTONIO JAMES & MARIE	3168 SUNSET AVE	Blk. 004 / Unit 011
143	ABBETT GERALD M & VIVIAN B	3154 SUNSET AVE	Blk. 004 / Unit 008
144	LAW STEVEN R	3152 SUNSET AVE	Blk. 004 / Unit 077

TABLE 3-1

East Norriton Township
Existing On-Lot Disposal Systems

	OWNER	PARCEL_ADDRESS	Parcel Tax Map Identification
145	LUGO DAVID	3148 SUNSET AVE	Blk. 004 / Unit 082
146	JAMES THERESA A	2936 SUNSET AVE	Blk. 004H / Unit 016
147	JONES PATRICIA N	2932 SUNSET AVE	Blk. 004 / Unit 095
148	NATALE ANTONIO & MARIA	2928 SUNSET AVE	Blk. 004 / Unit 015
149	CAIN ALICE B	2914 SUNSET AVE	Blk. 004 / Unit 051
150	ELKO MARK M & LANCE M ECHTERNACH	2918 SUNSET AVE	Blk. 004 / Unit 045
151	HENDEL ROBERT J & PATRICIA M	2910 SUNSET AVE	Blk. 004 / Unit 043
152	GROW THOMAS PAUL	2904 SUNSET AVE	Blk. 004 / Unit 084
153	ZAFFARANO FRANK A & FRANCES A	2803 SWEDE RD	Blk. 005B / Unit 027
154	DECARME WILLIAM C & JEAN R	2206 SWEDE RD	Blk. 019 / Unit 004
155	BARRINGTON SAMUEL H & DORIS H	W TOWNSHIP LINE RD	Blk. 006 / Unit 006 (Priority I Preservation)
156	BARTEK JOSEPH J & MARIETTS A	123 W TOWNSHIP LINE RD	Blk. 006 / Unit 073
157	DOERNER JOHN M & SYLVIA A	113 W TOWNSHIP LINE RD	Blk. 006 / Unit 015
158	FILORETO JOHN A	115 W TOWNSHIP LINE RD	Blk. 006 / Unit 018
159	GILL QUARRIES INC	1211 W TOWNSHIP LINE RD	Blk. 001 / Unit 057
160	KNIGHT KENNETH J	109 W TOWNSHIP LINE RD	Blk. 006 / Unit 019
161	LEPOLD AGNES G	129 W TOWNSHIP LINE RD	Blk. 006 / Unit 036
162	OLIVET REFORMED CHURCH OF PHILA	619 W TOWNSHIP LINE RD	Blk. 004D / Unit 030 (Priority I Preservation)
163	ROGERS THOMAS W & MARY ANN	121 W TOWNSHIP LINE RD	Blk. 006 / Unit 071
164	SCHULTZ BERNARD J & BELLA	117 W TOWNSHIP LINE RD	Blk. 006 / Unit 017
165	SEGAL STANLEY J & ADELE	127 W TOWNSHIP LINE RD	Blk. 006 / Unit 035
166	SEIDERS THERESA F / WATERMAN SUSANNE	419 W TOWNSHIP LINE RD	Blk. 006 / Unit 004
167	SIEGLE FREDERICK C JR & T MARION	417 W TOWNSHIP LINE RD	Blk. 006 / Unit 049
168	STACK MATTHEW R	411 W TOWNSHIP LINE RD	Blk. 006 / Unit 028
169	TRANKLE KENNETH P & PAULETTE	617 W TOWNSHIP LINE RD	Blk. 004G / Unit 039 (Priority I Preservation)
170	KLEM PATRICK & TAMI	1241 W TOWNSHIP LINE RD	Blk. 001 / Unit 037
171	BOYLE HIGH W & SANDRA L	1239 W TOWNSHIP LINE RD	Blk. 001 / Unit 038
172	MARTIN DAVID N	1237 W TOWNSHIP LINE RD	Blk. 001 / Unit 039
173	NEWMAN CHARLES L & SHIRLEY S	1235 W TOWNSHIP LINE RD	Blk. 001 / Unit 047
174	NEWMAN ROBERT & CATHERINE F	1233 W TOWNSHIP LINE RD	Blk. 001 / Unit 040
175	PUMO JOHN P & KATHLEEN D	1229 W TOWNSHIP LINE RD	Blk. 001 / Unit 0
176	GILL QUARRIES INC	1215 W TOWNSHIP LINE RD	Blk. 001 / Unit 055
177	BANKO RONALD C	613 W TOWNSHIP LINE RD	Blk. 004G / Unit 021
178	ZUCK DALE A & RAY A	421 W TOWNSHIP LINE RD	Blk. 006 / Unit 061
179	SEIDERS THERESA F / WATERMAN	111 W TOWNSHIP LINE RD	Blk. 006 / Unit 020
180	BISHOP FRANK R & SUSAN C	541 W GERMANTOWN PK	Blk. 004 / Unit 040
181	DAVIS WILLIAM JR & JANE E	334 W GERMANTOWN PK	Blk. 005 / Unit 012
182	TURANO DANTE A & CHRISTINE N	1052 W GERMANTOWN PK	Blk. 002A / Unit 013
183	MAXI GROUP & GAMBONE BROS	1044 W GERMANTOWN PK	Blk. 002A / Unit 017
184	GAMBONE BROS DEV CORP	1036 W GERMANTOWN PK	Blk. 002A / Unit 020
185	SHARON G CORP	1030 W GERMANTOWN PK	Blk. 002A / Unit 026
186	GORMAN GEORGE J JR & EVELYN C	1026 W GERMANTOWN PK	Blk. 002A / Unit 027
187	VENTO PHILIP A	1022 W GERMANTOWN PK	Blk. 002A / Unit 028
188	BONGIOVI FRANK & JEAN	1018 W GERMANTOWN PK	Blk. 002A / Unit 029
189	1010 GERMANTOWN PIKE ASSOCIATES	1012 W GERMANTOWN PK	Blk. 002A / Unit 030
190	ENIP-5, A PENNA LIMITED PARTNERSHIP	1008 W GERMANTOWN PK	Blk. 002 / Unit 031
191	GRISAFI JOSEPH & SUSAN	834 W GERMANTOWN PK	Blk. 003C / Unit 005
192	SHEARN VICTOR F & PATRICIA MORETTI	832 W GERMANTOWN PK	Blk. 003C / Unit 004

TABLE 3-1

East Norriton Township
Existing On-Lot Disposal Systems

	OWNER	PARCEL_ADDRESS	Parcel Tax Map Identification
193	KRANICH RALPH & LUCINDA	824 W GERMANTOWN PK	Blk. 003C / Unit 002
194	GREATER NORRISTOWN ART LEAGUE	800 W GERMANTOWN PK	Blk. 003B / Unit 003
195	SKROLLING STONE INVESTMENTS LLC	716 W GERMANTOWN PK	Blk. 003A / Unit 038
196	ALFONSE JOHN T JR	1055 W GERMANTOWN PK	Blk. 002A / Unit 015
197	GLENN FARM, LP	1005 W GERMANTOWN PK	Blk. 002A / Unit 019
198	LFT REALTY	911 W GERMANTOWN PK	Blk. 003 / Unit 005
199	WOODS GOLF CENTER INC	549 W GERMANTOWN PK	Blk. 004 / Unit 024
200	BEYER RUTH M	117 W HARTRANFT BLVD	Blk. 023 / Unit 032
201	THOMAS CHARLES & JULIE	218 WARSAW ST	Blk. 030 / Unit 010
202	BOSLER JOHN R JR & DOROTHY	3032 N WHITEHALL RD	Blk. 004D / Unit 008
203	KEITH TORNETTA	N WHITEHALL RD	Blk. 004D / Unit 021
204	WOOD S GOLF CENTER INC	N WHITEHALL RD	Blk. 004D / Unit 020
205	KUMPF ROBERT E & ROSEANN F	1102 WOODLAND AVE	Blk. 001 / Unit 054
206	FAIRVIEW VILLAGE CONGREGATION OF	1120 WOODLAND AVE	Blk. 001 / Unit 062
207	PAULIN H DOUGLAS	1018 WOODLAND AVE	Blk. 001 / Unit 061
208	SAPOVITS STEVEN R & SUSAN	1012 WOODLAND AVE	Blk. 001 / Unit 046
209	WOLFE JAMES L & PATRICIA E	1008 WOODLAND AVE	Blk. 001 / Unit 049

TABLE 3-2

East Norriton Township

Pump Station Flows (mgd)

		Norris City Ave.		Timberlake		Germantown			Sandra Lane	
Date	Rainfall (in.)	Totalizer	Daily Flow	Totalizer	Daily Flow	Totalizer	Daily Flow	Overflow	Totalizer	Daily Flow
1/1/2002		3191054	1.172							
1/2/2002		3192226	1.212							
1/3/2002		3193438	1.218							
1/4/2002		3194656	1.160							
1/5/2002		3195816	1.217							
1/6/2002	1.10	3197033	1.802							
1/7/2002	0.15	3198835	1.612							
1/8/2002		3200447	1.378							
1/9/2002	0.05	3201825	1.367							
1/10/2002		3203192	1.554							
1/11/2002	0.35	3204746	2.355							
1/12/2002		3207101	1.728							
1/13/2002		3208829	1.476							
1/14/2002		3210305	1.321							
1/15/2002		3211626	1.272							
1/16/2002		3212898	1.247							
1/17/2002		3214145	1.277							
1/18/2002		3215422	1.170							
1/19/2002	0.60	3216592	1.416							
1/20/2002		3218008	1.298							
1/21/2002		3219306	1.214							
1/22/2002		3220520	1.298							
1/23/2002		3221818	1.497							
1/24/2002	0.85	3223315	2.898							
1/25/2002		3226213	1.930							
1/26/2002		3228143	1.620							
1/27/2002		3229763	1.313							
1/28/2002		3231076	1.368							
1/29/2002		3232444	1.309							
1/30/2002		3233753	1.612							
1/31/2002		3235365	1.815							
2/1/2002	0.10	3237180	1.858							
2/2/2002		3239038	1.652							
2/3/2002		3240690	1.459							
2/4/2002		3242149	1.421							
2/5/2002		3243570	1.386							
2/6/2002		3244956	1.334							
2/7/2002	0.05	3246290	1.416							
2/8/2002		3247706	1.331							
2/9/2002		3249037	1.399							
2/10/2002	0.10	3250436	1.459							
2/11/2002		3251895	1.365							
2/12/2002		3253260	1.295							
2/13/2002		3254555	1.244							
2/14/2002		3255799	1.233							
2/15/2002		3257032	1.351							
2/16/2002		3258383	1.507							
2/17/2002		3259890	0.954							
2/18/2002		3260844	1.355							
2/19/2002		3262199	1.159							
2/20/2002	0.15	3263358	1.280							
2/21/2002		3264638	1.362							
2/22/2002		3266000	1.132							
2/23/2002		3267132	1.289							
2/24/2002		3268421	1.226							
2/25/2002		3269647	1.202							
2/26/2002		3270849	1.197							
2/27/2002		3272046	1.166							
2/28/2002		3273212	1.169							
3/1/2002		3274381	1.206							

TABLE 3-2

East Norriton Township

Pump Station Flows (mgd)

		Norris City Ave.		Timberlake		Germantown			Sandra Lane	
Date	Rainfall (in.)	Totalizer	Daily Flow	Totalizer	Daily Flow	Totalizer	Daily Flow	Overflow	Totalizer	Daily Flow
3/2/2002		3275587	2.120							
3/3/2002	1.25	3277707	2.001							
3/4/2002		3279708	1.586							
3/5/2002		3281294	1.448							
3/6/2002		3282742	1.369							
3/7/2002		3284111	1.741							
3/8/2002		3285852	0.957							
3/9/2002		3286809	1.490							
3/10/2002	0.10	3288299	1.292							
3/11/2002		3289591	1.312							
3/12/2002		3290903	1.258							
3/13/2002	0.25	3292161	1.536							
3/14/2002		3293697	1.397							
3/15/2002		3295094	1.307							
3/16/2002		3296401	1.375							
3/17/2002	0.70	3297776	1.819							
3/18/2002		3299595	2.552							
3/19/2002		3302147	1.920							
3/20/2002	1.10	3304067	4.290							
3/21/2002		3308357	2.583							
3/22/2002		3310940	2.028							
3/23/2002		3312968	1.834							
3/24/2002		3314802	1.807							
3/25/2002		3316609	1.592							
3/26/2002	0.60	3318201	2.075							
3/27/2002		3320276	2.193							
3/28/2002		3322469	2.098							
3/29/2002		3324567	1.638							
3/30/2002		3326205	1.798							
3/31/2002	0.25	3328003	1.688							
4/1/2002		3329691	1.809							
4/2/2002		3331500	1.557							
4/3/2002		3333057	1.654							
4/4/2002		3334711	1.508							
4/5/2002		3336219	1.488							
4/6/2002		3337707	1.726							
4/7/2002		3339433	1.200							
4/8/2002		3340633	1.622							
4/9/2002	0.10	3342255	1.268							
4/10/2002		3343523	1.409							
4/11/2002		3344932	1.359							
4/12/2002	0.20	3346291	2.139							
4/13/2002		3348430	1.065							
4/14/2002	0.10	3349495	1.343							
4/15/2002		3350838	1.438							
4/16/2002		3352276	1.419							
4/17/2002		3353695	1.312							
4/18/2002		3355007	1.342							
4/19/2002	0.30	3356349	1.340							
4/20/2002		3357689	1.471							
4/21/2002	0.30	3359160	1.474							
4/22/2002	0.10	3360634	1.598							
4/23/2002		3362232	1.424							
4/24/2002		3363656	1.372							
4/25/2002	0.20	3365028	1.503							
4/26/2002		3366531	1.336							
4/27/2002		3367867	2.067							
4/28/2002	1.10	3369934	2.236							
4/29/2002		3372170	1.851							
4/30/2002	0.20	3374021	1.838							

TABLE 3-2

East Norriton Township

Pump Station Flows (mgd)

		Norris City Ave.		Timberlake		Germantown			Sandra Lane	
Date	Rainfall (in.)	Totalizer	Daily Flow	Totalizer	Daily Flow	Totalizer	Daily Flow	Overflow	Totalizer	Daily Flow
5/1/2002		3375859	1.722							
5/2/2002	0.45	3377581	2.164							
5/3/2002		3379745	1.838							
5/4/2002		3381583	2.068							
5/5/2002		3383651	1.279							
5/6/2002		3384930	1.556							
5/7/2002		3386486	1.491							
5/8/2002		3387977	1.470							
5/9/2002	0.70	3389447	1.914							
5/10/2002		3391361	1.849							
5/11/2002		3393210	1.980							
5/12/2002	0.65	3395190	1.089							
5/13/2002	0.95	3396279	2.820							
5/14/2002		3399099	2.442							
5/15/2002		3401541	2.030							
5/16/2002		3403571	1.796							
5/17/2002		3405367	2.526							
5/18/2002	1.70	3407893	4.407							
5/19/2002		3412300	2.452							
5/20/2002		3414752	2.266							
5/21/2002		3417018	2.031							
5/22/2002		3419049	1.878							
5/23/2002		3420927	1.819							
5/24/2002		3422746	1.836							
5/25/2002		3424582	1.557							
5/26/2002	0.10	3426139	1.647							
5/27/2002	0.10	3427786	1.671							
5/28/2002		3429457	1.619							
5/29/2002		3431076	1.560							
5/30/2002		3432636	1.497							
5/31/2002		3434133	1.330							
6/1/2002		3435463	1.614							
6/2/2002		3437077	1.586							
6/3/2002		3438663	1.375							
6/4/2002		3440038	1.388							
6/5/2002		3441426	1.405							
6/6/2002	2.50	3442831	2.615							
6/7/2002		3445446	2.271							
6/8/2002		3447717	1.839							
6/9/2002		3449556	1.396							
6/10/2002		3450952	1.613							
6/11/2002	0.20	3452565	1.680							
6/12/2002		3454245	1.573							
6/13/2002	0.20	3455818	1.571							
6/14/2002	0.50	3457389	2.051							
6/15/2002	0.10	3459440	2.106							
6/16/2002		3461546	1.551							
6/17/2002		3463097	1.634							
6/18/2002	0.20	3464731	1.633							
6/19/2002	0.25	3466364	1.672							
6/20/2002		3468036	1.578							
6/21/2002		3469614	1.690							
6/22/2002		3471304	1.473							
6/23/2002		3472777	1.392							
6/24/2002	0.30	3474169	1.535							
6/25/2002		3475704	1.442							
6/26/2002		3477146	1.443							
6/27/2002	0.80	3478589	1.764							
6/28/2002		3480353	1.627							
6/29/2002		3481980	1.521							

TABLE 3-2

East Norriton Township

Pump Station Flows (mgd)

		Norris City Ave.		Timberlake		Germantown			Sandra Lane	
Date	Rainfall (in.)	Totalizer	Daily Flow	Totalizer	Daily Flow	Totalizer	Daily Flow	Overflow	Totalizer	Daily Flow
6/30/2002		3483501	1.552							
7/1/2002		3485053	1.466							
7/2/2002		3486519	1.425							
7/3/2002		3487944	1.437							
7/4/2002		3489381	1.438							
7/5/2002		3490819	1.313							
7/6/2002		3492132	1.382							
7/7/2002		3493514	1.192							
7/8/2002		3494706	1.384							
7/9/2002	0.80	3496090	1.468							
7/10/2002		3497558	1.406							
7/11/2002		3498964	1.354							
7/12/2002		3500318	1.450							
7/13/2002		3501768	1.407							
7/14/2002		3503175	1.189							
7/15/2002		3504364	1.342							
7/16/2002		3505706	1.256							
7/17/2002		3506962	1.295							
7/18/2002		3508257	1.248							
7/19/2002	0.20	3509505	1.428							
7/20/2002		3510933	1.359							
7/21/2002		3512292	1.171							
7/22/2002		3513463	1.238							
7/23/2002	0.20	3514701	1.301							
7/24/2002		3516002	1.285							
7/25/2002		3517287	1.232							
7/26/2002		3518519	1.228							
7/27/2002		3519747	1.253							
7/28/2002		3521000	1.316							
7/29/2002		3522316	1.276							
7/30/2002		3523592	1.238							
7/31/2002		3524830	1.381							
8/1/2002	0.10	3526211	1.058							
8/2/2002	0.20	3527269	0.945							
8/3/2002	0.20	3528214	1.705							
8/4/2002		3529919	1.266							
8/5/2002	0.10	3531185	1.288							
8/6/2002		3532473	1.221							
8/7/2002		3533694	0.708							
8/8/2002		3534402	1.716							
8/9/2002		3536118	1.197							
8/10/2002		3537315	1.212							
8/11/2002		3538527	1.262							
8/12/2002		3539789	1.193							
8/13/2002		3540982	1.188							
8/14/2002		3542170	1.239							
8/15/2002		3543409	1.175							
8/16/2002		3544584	1.383							
8/17/2002		3545967	1.336							
8/18/2002		3547303	0.997							
8/19/2002	0.10	3548300	1.197							
8/20/2002		3549497	1.218							
8/21/2002		3550715	1.177							
8/22/2002		3551892	1.168							
8/23/2002		3553060	1.196							
8/24/2002	1.10	3554256	1.631							
8/25/2002		3555887	1.038							
8/26/2002		3556925	1.378							
8/27/2002		3558303	1.021							
8/28/2002		3559324	1.376							

TABLE 3-2

East Norriton Township

Pump Station Flows (mgd)

		Norris City Ave.		Timberlake		Germantown			Sandra Lane	
Date	Rainfall (in.)	Totalizer	Daily Flow	Totalizer	Daily Flow	Totalizer	Daily Flow	Overflow	Totalizer	Daily Flow
8/29/2002		3560700	1.522							
8/30/2002	1.15	3562222	1.245							
8/31/2002		3563467	1.308							
9/1/2002	0.80	3564775	1.808							
9/2/2002		3566583	1.456							
9/3/2002		3568039	1.342							
9/4/2002		3569381	1.231							
9/5/2002		3570612	1.268							
9/6/2002		3571880	1.160							
9/7/2002		3573040	1.351							
9/8/2002		3574391	1.225							
9/9/2002		3575616	1.213							
9/10/2002		3576829	1.145							
9/11/2002		3577974	1.229							
9/12/2002		3579203	1.517							
9/13/2002		3580720	0.952							
9/14/2002		3581672	1.223							
9/15/2002	0.50	3582895	1.447							
9/16/2002		3584342	1.139							
9/17/2002		3585481	1.196							
9/18/2002		3586677	1.159							
9/19/2002		3587836	1.153							
9/20/2002		3588989	1.130							
9/21/2002		3590119	1.293							
9/22/2002		3591412	1.326							
9/23/2002		3592738	1.214							
9/24/2002		3593952	1.181							
9/25/2002		3595133	1.174							
9/26/2002	2.00	3596307	1.950							
9/27/2002	0.50	3598257	2.037							
9/28/2002		3600294	1.679							
9/29/2002		3601973	1.363							
9/30/2002		3603336	1.309							
10/1/2002		3604645	1.258							
10/2/2002		3605903	1.249							
10/3/2002	0.10	3607152	1.312							
10/4/2002		3608464	1.355							
10/5/2002		3609819	1.378							
10/6/2002		3611197	1.297							
10/7/2002		3612494	1.239							
10/8/2002		3613733	1.239							
10/9/2002		3614972	1.253							
10/10/2002	1.00	3616225	1.714							
10/11/2002	0.90	3617939	2.916							
10/12/2002		3620855	1.983							
10/13/2002		3622838	1.455							
10/14/2002		3624293	1.478							
10/15/2002		3625771	1.369							
10/16/2002	1.15	3627140	2.646							
10/17/2002	0.05	3629786	1.794							
10/18/2002		3631580	1.858							
10/19/2002		3633438	1.597							
10/20/2002		3635035	1.051							
10/21/2002		3636086	1.368							
10/22/2002		3637454	1.387							
10/23/2002		3638841	1.256							
10/24/2002		3640097	1.323							
10/25/2002		3641420	1.962							
10/26/2002	0.90	3643382	2.047							
10/27/2002		3645429	1.482							

TABLE 3-2

East Norriton Township

Pump Station Flows (mgd)

		Norris City Ave.		Timberlake		Germantown			Sandra Lane	
Date	Rainfall (in.)	Totalizer	Daily Flow	Totalizer	Daily Flow	Totalizer	Daily Flow	Overflow	Totalizer	Daily Flow
10/28/2002		3646911	1.520							
10/29/2002	0.80	3648431	2.188							
10/30/2002	0.80	3650619	3.475							
10/31/2002		3654094	2.285							
11/1/2002	0.10	3656379	2.059							
11/2/2002		3658438	1.825							
11/3/2002		3660263	1.737							
11/4/2002		3662000	1.633							
11/5/2002	0.50	3663633	1.927							
11/6/2002		3665560	2.044							
11/7/2002		3667604	1.780							
11/8/2002		3669384	1.752							
11/9/2002		3671136	1.742							
11/10/2002		3672878	1.593							
11/11/2002	0.10	3674471	1.541							
11/12/2002	1.00	3676012	3.296							
11/13/2002		3679308	2.518							
11/14/2002		3681826	2.006							
11/15/2002		3683832	2.116							
11/16/2002	1.10	3685948	4.776							
11/17/2002	1.00	3690724	4.053							
11/18/2002		3694777	3.671							
11/19/2002		3698448	2.631							
11/20/2002		3701079	2.293							
11/21/2002	0.10	3703372	2.196							
11/22/2002	0.25	3705568	2.515							
11/23/2002		3708083	2.131							
11/24/2002		3710214	2.059							
11/25/2002		3712273	1.929							
11/26/2002	0.40	3714202	1.923							
11/27/2002		3716125	2.418							
11/28/2002		3718543	1.947							
11/29/2002		3720490	2.137							
11/30/2002		3722627	1.714							
12/1/2002		3724341	1.756							
12/2/2002		3726097	1.683							
12/3/2002		3727780	1.611							
12/4/2002		3729391	1.502							
12/5/2002	0.80	3730893	1.641							
12/6/2002		3732534	1.624							
12/7/2002		3734158	1.612							
12/8/2002		3735770	1.706							
12/9/2002		3737476	1.568							
12/10/2002		3739044	1.535							
12/11/2002	1.70	3740579	4.491							
12/12/2002		3745070	4.603							
12/13/2002	0.60	3749673	4.709							
12/14/2002	0.10	3754382	5.117							
12/15/2002		3759499	2.676							
12/16/2002		3762175	2.687							
12/17/2002		3764862	2.317							
12/18/2002		3767179	2.168							
12/19/2002		3769347	2.108							
12/20/2002	0.60	3771455	3.726							
12/21/2002		3775181	3.126							
12/22/2002		3778307	1.720							
12/23/2002		3780027	2.641							
12/24/2002		3782668	1.862							
12/25/2002	1.50	3784530	4.408							
12/26/2002		3788938	3.599							

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East Norriton Township

Pump Station Flows (mgd)

		Norris City Ave.		Timberlake		Germantown			Sandra Lane	
Date	Rainfall (in.)	Totalizer	Daily Flow	Totalizer	Daily Flow	Totalizer	Daily Flow	Overflow	Totalizer	Daily Flow
12/27/2002		3792537	3.203							
12/28/2002		3795740	2.772							
12/29/2002		3798512	2.319							
12/30/2002		3800831	2.468							
12/31/2002	43.55	3803299	2.503							
Annual Avg.	**2002**		**1.684**							
	Gravity to Sawmill PS		0.060							
	Total ENT annual ADF		**1.744**							
1/1/2003	1.10	3805802	4.659	2249564	3.529	1007834	1.835	0.2087		
1/2/2003		3810461	3.888	2253093	2.524	1009669	1.387	0.0052		
1/3/2003	0.40	3814349	4.552	2255617	2.858	1011056	1.502			
1/4/2003		3818901	3.359	2258475	2.150	1012558	1.061			
1/5/2003	0.40	3822260	2.660	2260625	1.666	1013619	0.804			
1/6/2003		3824920	2.984	2262291	1.969	1014423	0.882			
1/7/2003		3827904	2.656	2264260	1.599	1015305	0.739			
1/8/2003		3830560	2.699	2265859	1.573	1016044	0.771			
1/9/2003		3833259	2.501	2267432	1.585	1016815	0.697			
1/10/2003		3835760	2.362	2269017	1.278	1017512	0.609			
1/11/2003		3838122	2.260	2270295	1.332	1018121	0.580			
1/12/2003		3840382	2.301	2271627	2.362	1018701	0.551			
1/13/2003		3842683	1.842	2273989	0.170	1019252	0.538			
1/14/2003		3844525	1.904	2274159	1.037	1019790	0.440			
1/15/2003		3846429	1.802	2275196	0.995	1020230	0.366			
1/16/2003	0.10	3848231	1.759	2276191	0.986	1020596	0.373			
1/17/2003		3849990	1.759	2277177	0.826	1020969	0.337			
1/18/2003		3851749	1.957	2278003	1.077	1021306	0.421			
1/19/2003		3853706	1.642	2279080	0.893	1021727	0.340			
1/20/2003		3855348	1.629	2279973	0.999	1022067	0.371			
1/21/2003		3856977	1.605	2280972	0.868	1022438	0.326			
1/22/2003		3858582	1.534	2281840	0.780	1022764	0.285			
1/23/2003		3860116	1.559	2282620	0.833	1023049	0.308			
1/24/2003		3861675	2.118	2283453	0.984	1023357	0.369			
1/25/2003		3863793	1.102	2284437	0.582	1023726	0.215			
1/26/2003		3864895	1.522	2285019	0.889	1023941	0.332			
1/27/2003		3866417	1.488	2285908	0.763	1024273	0.280			
1/28/2003		3867905	1.568	2286671	0.781	1024553	0.275			
1/29/2003	0.20	3869473	1.261	2287452	0.712	1024828	0.272			
1/30/2003		3870734	1.423	2288164	0.712	1025100	0.242			
1/31/2003		3872157	1.544	2288876	0.766	1025342	0.284			
2/1/2003		3873701	1.602	2289642	0.868	1025626	0.326			
2/2/2003		3875303	1.380	2290510	0.879	1025952	0.332			
2/3/2003		3876683	1.495	2291389	0.808	1026284	0.320			
2/4/2003	0.25	3878178	1.784	2292197	1.191	1026604	0.462			
2/5/2003		3879962	1.479	2293388	0.677	1027066	0.294			
2/6/2003		3881441	1.840	2294065	0.905	1027360	0.383			
2/7/2003	0.90	3883281	1.419	2294970	0.833	1027743	0.297			
2/8/2003		3884700	1.300	2295803	0.647	1028040	0.248			
2/9/2003		3886000	1.449	2296450	0.870	1028288	0.341			
2/10/2003	0.10	3887449	1.473	2297320	0.816	1028629	0.326			
2/11/2003		3888922	1.597	2298136	0.843	1028955	0.322			
2/12/2003		3890519	1.279	2298979	0.736	1029277	0.264			
2/13/2003		3891798	1.372	2299715	0.747	1029541	0.272			
2/14/2003		3893170	1.371	2300462	0.688	1029813	0.253			
2/15/2003		3894541	1.440	2301150	0.746	1030066	0.293			
2/16/2003	1.00	3895981	1.479	2301896	0.846	1030359	0.351			
2/17/2003	1.50	-	1.479		0.846		0.351			
2/18/2003		3898939	1.211	2303588	0.833	1031060	0.218			

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East Norriton Township

Pump Station Flows (mgd)

		Norris City Ave.		Timberlake		Germantown			Sandra Lane	
Date	Rainfall (in.)	Totalizer	Daily Flow	Totalizer	Daily Flow	Totalizer	Daily Flow	Overflow	Totalizer	Daily Flow
2/19/2003		3900150	1.362	2304421	0.685	1031278	0.301			
2/20/2003		3901512	1.621	2305106	0.930	1031579	0.393			
2/21/2003	0.30	3903133	2.152	2306036	1.220	1031972	0.572			
2/22/2003	2.20	3905285	7.106	2307256	4.576	1032544	2.259	0.2413		
2/23/2003		3912391	5.285	2311832	3.538	1034803	1.919			
2/24/2003		3917676	3.090	2315370	2.247	1036722	1.186			
2/25/2003		3920766	2.745	2317617	1.732	1037908	0.791			
2/26/2003		3923511	2.365	2319349	1.298	1038699	0.618			
2/27/2003		3925876	2.119	2320647	1.241	1039317	0.495			
2/28/2003	0.20	3927995	2.469	2321888	1.324	1039812	0.613			
3/1/2003		3930464	2.293	2323212	1.328	1040425	0.572			
3/2/2003	0.70	3932757	4.418	2324540	3.600	1040997	1.708	0.2897		
3/3/2003		3937175	3.737	2328140	1.961	1042705	1.141			
3/4/2003		3940912	2.590	2330101	1.669	1043846	0.845			
3/5/2003	0.30	3943502	5.227	2331770	3.354	1044691	1.723	0.0382		
3/6/2003	0.80	3948729	4.915	2335124	3.617	1046414	1.929	0.2066		
3/7/2003		3953644	4.232	2338741	2.527	1048343	1.222			
3/8/2003		3957876	3.773	2341268	2.446	1049565	1.234			
3/9/2003		3961649	4.299	2343714	2.973	1050799	1.551	0.0507		
3/10/2003		3965948	3.252	2346687	2.044	1052350	0.932			
3/11/2003		3969200	2.823	2348731	1.658	1053282	0.752			
3/12/2003		3972023	3.116	2350389	2.158	1054034	0.896			
3/13/2003		3975139	3.209	2352547	1.737	1054930	0.952			
3/14/2003		3978348	3.153	2354284	1.892	1055882	0.856			
3/15/2003		3981501	2.837	2356176	1.737	1056738	0.787			
3/16/2003		3984338	2.587	2357913	1.621	1057525	0.750			
3/17/2003		3986925	2.730	2359534	1.754	1058275	0.799			
3/18/2003		3989655	2.422	2361288	1.503	1059074	0.655			
3/19/2003		3992077	2.231	2362791	1.173	1059729	0.515			
3/20/2003	1.30	3994308	4.899	2363964	3.530	1060244	1.665	0.0977		
3/21/2003		3999207	4.400	2367494	2.621	1061909	1.459	0.1128		
3/22/2003		4003607	3.378	2370115	2.131	1063368	0.991			
3/23/2003		4006985	2.866	2372246	1.682	1064359	0.770			
3/24/2003		4009851	2.531	2373928	1.530	1065129	0.620			
3/25/2003		4012382	2.311	2375458	1.315	1065749	0.557			
3/26/2003	0.30	4014693	2.514	2376773	1.490	1066306	0.652			
3/27/2003		4017207	2.306	2378263	1.327	1066958	0.569			
3/28/2003		4019513	2.103	2379590	1.046	1067527	0.454			
3/29/2003	0.30	4021616	2.614	2380636	1.595	1067981	0.755			
3/30/2003	0.30	4024230	3.025	2382231	2.196	1068736	1.108			
3/31/2003		4027255	2.574	2384427	1.676	1069844	0.815			
4/1/2003	0.15	4029829	2.440	2386103	1.621	1070659	0.790			
4/2/2003		4032269	2.421	2387724	1.430	1071449	0.696			
4/3/2003		4034690	2.161	2389154	1.259	1072145	0.574			
4/4/2003		4036851	2.013	2390413	1.191	1072719	0.511			
4/5/2003			2.013		1.191		0.511			
4/6/2003			2.013		1.191		0.511			
4/7/2003	0.50	4042891	2.491	2393985	1.632	1074251	0.781			
4/8/2003		4045382	2.407	2395617	1.546	1075032	0.736			
4/9/2003	0.35	4047789	3.315	2397163	2.296	1075768	1.261			
4/10/2003		4051104	2.772	2399459	1.856	1077029	0.918			
4/11/2003	0.80	4053876	3.765	2401315	2.536	1077947	1.349	0.0224		
4/12/2003			3.765		2.536		1.349			
4/13/2003			3.765		2.536		1.349			
4/14/2003		4065171	2.626	2408923	1.565	1081993	0.728			
4/15/2003		4067797	2.418	2410488	1.444	1082721	0.617			
4/16/2003		4070215	2.175	2411932	1.242	1083338	0.532			
4/17/2003		4072390	2.016	2413174	1.146	1083870	0.458			
4/18/2003			2.016		1.146		0.458			
4/19/2003	0.20		2.016		1.146		0.458			

TABLE 3-2

East Norriton Township

Pump Station Flows (mgd)

		Norris City Ave.		Timberlake		Germantown			Sandra Lane	
Date	Rainfall (in.)	Totalizer	Daily Flow	Totalizer	Daily Flow	Totalizer	Daily Flow	Overflow	Totalizer	Daily Flow
4/20/2003			2.016		1.146		0.458			
4/21/2003		4080454	1.969	2417759	1.054	1085703	0.409			
4/22/2003		4082423	1.903	2418813	1.100	1086112	0.434			
4/23/2003		4084326	1.790	2419913	0.937	1086546	0.382			
4/24/2003		4086116	1.746	2420850	0.943	1086928	0.354			
4/25/2003		4087862	1.906	2421793	1.075	1087282	0.457			
4/26/2003	0.30		1.906		1.075		0.457			
4/27/2003			1.906		1.075		0.457			
4/28/2003		4093581	1.738	2425019	0.986	1088652	0.397			
4/29/2003		4095319	1.652	2426005	0.905	1089049	0.354			
4/30/2003		4096971	1.635	2426910	0.887	1089403	0.310			
5/1/2003		4098606	1.617	2427797	0.858	1089713	0.330			
5/2/2003		4100223	1.592	2428655	0.843	1090043	0.324			
5/3/2003			1.592		0.843		0.324			
5/4/2003			1.592		0.843		0.324			
5/5/2003	0.10	4105000	1.583	2431184	0.828	1091015	0.313			
5/6/2003		4106583	1.541	2432012	0.870	1091328	0.324			
5/7/2003	0.50	4108124	1.668	2432882	0.894	1091652	0.352			
5/8/2003	0.05	4109792	1.707	2433776	0.889	1092004	0.382			
5/9/2003	0.05	4111499	1.611	2434665	0.873	1092386	0.345			
5/10/2003			1.611		0.873		0.345			
5/11/2003			1.611		0.873		0.345			
5/12/2003		4116333	1.924	2437285	0.961	1093420	0.372			
5/13/2003		4118257	1.096	2438246	0.658	1093792	0.255			
5/14/2003		4119353	1.489	2438904	0.794	1094047	0.274			
5/15/2003		4120842	1.434	2439698	0.721	1094321	0.282			
5/16/2003	0.40	4122276	1.586	2440419	0.850	1094603	0.368			
5/17/2003			1.586		0.850		0.368			
5/18/2003			1.586		0.850		0.368			
5/19/2003		4127034	1.475	2442970	0.890	1095706	0.293			
5/20/2003		4128509	1.699	2443860	0.782	1095999	0.291			
5/21/2003		4130208	1.364	2444642	0.889	1096290	0.391			
5/22/2003		4131572	1.473	2445531	0.798	1096681	0.317			
5/23/2003	0.30	4133045	2.256	2446329	1.419	1096998	0.718			
5/24/2003	0.20		2.256		1.419		0.718			
5/25/2003			2.256		1.419		0.718			
5/26/2003	1.50		2.256		1.419		0.718	0.0392		
5/27/2003		4142069	2.330	2452004	1.443	1099871	0.822			
5/28/2003	0.05	4144399	2.072	2453447	1.152	1100693	0.603			
5/29/2003		4146471	1.976	2454599	1.132	1101296	0.483			
5/30/2003		4148447	2.044	2455731	1.221	1101779	0.597			
5/31/2003	0.50		2.044		1.221		0.597			
6/1/2003			2.044		1.221		0.597			
6/2/2003		4154580	1.994	2459393	1.212	1103569	0.574			
6/3/2003	1.00	4156574	2.846	2460605	1.732	1104143	0.904			
6/4/2003	1.20	4159420	5.425	2462337	4.320	1105047	2.409	0.2142		
6/5/2003		4164845	4.376	2466657	2.899	1107456	1.621	0.013		
6/6/2003		4169221	3.777	2469556	2.536	1109077	1.351			
6/7/2003	0.90		3.777		2.536		1.351	0.0435		
6/8/2003			3.777		2.536		1.351			
6/9/2003		4180552	2.956	2477164	1.775	1113129	0.864			
6/10/2003		4183508	2.606	2478939	1.533	1113993	0.724			
6/11/2003		4186114	2.344	2480472	1.238	1114717	0.518			
6/12/2003	0.20	4188458	2.206	2481710	1.260	1115235	0.528			
6/13/2003	1.00	4190664	3.310	2482970	2.154	1115763	1.117			
6/14/2003	0.30		3.310		2.154		1.117			
6/15/2003			3.310		2.154		1.117			
6/16/2003		4200594	2.381	2489432	1.378	1119115	0.554			
6/17/2003	0.60	4202975	2.473	2490810	1.604	1119669	0.702			
6/18/2003		4205448	2.123	2492414	1.609	1120371	0.781			

TABLE 3-2

East Norriton Township

Pump Station Flows (mgd)

		Norris City Ave.		Timberlake		Germantown			Sandra Lane	
Date	Rainfall (in.)	Totalizer	Daily Flow	Totalizer	Daily Flow	Totalizer	Daily Flow	Overflow	Totalizer	Daily Flow
6/19/2003	0.30	4207571	3.286	2494023	1.508	1121152	0.649			
6/20/2003	2.60	4210857	5.305	2495531	3.359	1121801	1.677	0.194		
6/21/2003			5.305		3.359		1.677	0.1156		
6/22/2003			5.305		3.359		1.677			
6/23/2003		4226773	3.645	2505607	2.064	1126833	0.865			
6/24/2003		4230418	2.853	2507671	1.509	1127698	0.542			
6/25/2003		4233271	2.111	2509180	1.313	1128240	0.516			
6/26/2003		4235382	2.329	2510493	1.346	1128756	0.454			
6/27/2003		4237711	2.084	2511839	1.164	1129210	0.402			
6/28/2003			2.084		1.164		0.402			
6/29/2003			2.084		1.164		0.402			
6/30/2003		4243962	1.951	2515332	0.799	1130417	0.257			
7/1/2003		4245913	1.811	2516131	0.963	1130674	0.304			
7/2/2003		4247724	1.773	2517094	0.884	1130978	0.304			
7/3/2003		4249497	1.735	2517978	0.932	1131282	0.315			
7/4/2003			1.735		0.932		0.315			
7/5/2003			1.735		0.932		0.315			
7/6/2003	0.20		1.735		0.932		0.315			
7/7/2003	0.40	4256435	1.739	2521707	1.042	1132543	0.330			
7/8/2003		4258174	1.640	2522749	0.793	1132873	0.334			
7/9/2003		4259814	1.592	2523542	0.768	1133207	0.260			
7/10/2003	0.10	4261406	1.602	2524310	0.849	1133467	0.290			
7/11/2003		4263008	1.726	2525159	0.903	1133757	0.332			
7/12/2003			1.811		0.963		0.304			
7/13/2003			1.811		0.963		0.304			
7/14/2003		4268186	1.101	2527867	0.616	1134752	0.201			
7/15/2003		4269287	1.519	2528483	0.873	1134953	0.262			
7/16/2003		4270806	1.495	2529356	0.660	1135215	0.253			
7/17/2003		4272301	1.492	2530016	0.887	1135468	0.271			
7/18/2003	0.30	4273793	1.519	2530903	0.758	1135739	0.295			
7/19/2003			1.519		0.758		0.295			
7/20/2003			1.519		0.758		0.295			
7/21/2003	0.90	4278351	1.655	2533177	1.144	1136625	0.369			
7/22/2003	0.05	4280006	1.585	2534321	0.678	1136994	0.363			
7/23/2003	0.20	4281591	1.549	2534999	0.911	1137357	0.367			
7/24/2003		4283140	1.560	2535910	0.810	1137724	0.413			
7/25/2003		4284700	1.445	2536720	0.763	1138137	0.273			
7/26/2003			1.445		0.763		0.273			
7/27/2003			1.445		0.763		0.273			
7/28/2003		4289034	1.381	2539010	0.766	1138955	0.290			
7/29/2003		4290415	1.351	2539776	0.677	1139245	0.265			
7/30/2003		4291766	1.369	2540453	0.686	1139510	0.241			
7/31/2003		4293135	1.356	2541139	0.714	1139751	0.235			
8/1/2003	0.20	4294491	1.462	2541853	0.816	1139986	0.343			
8/2/2003			1.462		0.816		0.343			
8/3/2003			1.462		0.816		0.343			
8/4/2003	0.95	4298877	1.857	2544300	1.095	1141016	0.595			
8/5/2003	2.40	4300734	3.403	2545395	2.383	1141611	1.349			
8/6/2003		4304137	2.224	2547778	1.316	1142960	0.761			
8/7/2003	0.50	4306361	2.078	2549094	1.255	1143721	0.663			
8/8/2003		4308439	2.949	2550349	1.968	1144384	1.062			
8/9/2003	0.50		2.949		1.968		1.062			
8/10/2003	1.70		2.949		1.968		1.062	0.1171		
8/11/2003	0.10	4317285	2.639	2556254	1.625	1147569	0.874			
8/12/2003		4319924	2.192	2557879	1.329	1148443	0.623			
8/13/2003		4322116	1.952	2559208	1.098	1149066	0.464			
8/14/2003		4324068	1.849	2560306	1.087	1149530	0.443			
8/15/2003		4325917	1.755	2561393	0.952	1149973	0.382		START-UP	
8/16/2003			1.755		0.952		0.382			
8/17/2003			1.755		0.952		0.382			

TABLE 3-2

East Norriton Township

Pump Station Flows (mgd)

		Norris City Ave.		Timberlake		Germantown			Sandra Lane	
Date	Rainfall (in.)	Totalizer	Daily Flow	Totalizer	Daily Flow	Totalizer	Daily Flow	Overflow	Totalizer	Daily Flow
8/18/2003		4331182	1.599	2564250	0.841	1151118	0.327			
8/19/2003		4332781	1.507	2565091	0.848	1151445	0.322		148419	0.026
8/20/2003		4334288	1.520	2565939	0.761	1151767	0.257		174489	0.024
8/21/2003		4335808	1.515	2566700	0.841	1152024	0.283			0.024
8/22/2003		4337323	1.503	2567541	0.764	1152307	0.297		246465	0.034
8/23/2003			1.503		0.764		0.297			0.034
8/24/2003			1.503		0.764		0.297			0.034
8/25/2003		4341831	1.414	2569833	0.758	1153197	0.251		348676	0.035
8/26/2003		4343245	1.406	2570591	0.771	1153448	0.263		383537	0.034
8/27/2003	0.25	4344651	2.268	2571362	0.789	1153711	0.293		417279	0.034
8/28/2003		4346919	1.601	2572151	0.713	1154004	0.243		451709	0.035
8/29/2003		4348520	1.239	2572864	0.829	1154247	0.318		486419	0.037
8/30/2003	0.50		1.239		0.829		0.318			0.037
8/31/2003			1.239		0.829		0.318			0.037
9/1/2003	0.40		1.239		0.829		0.318			0.037
9/2/2003		4353477	1.948	2576181	1.280	1155518	0.577		633733	0.064
9/3/2003		4355425	1.853	2577461	0.998	1156095	0.517		697681	0.063
9/4/2003		4357278	2.127	2578459	1.294	1156612	0.656		761029	0.072
9/5/2003		4359405	1.651	2579753	0.930	1157268	0.401		832791	0.044
9/6/2003			1.651		0.930		0.401			0.044
9/7/2003			1.651		0.930		0.401			0.044
9/8/2003		4364358	1.498	2582543	0.795	1158472	0.322		963808	0.038
9/9/2003	0.50	4365856	1.446	2583338	0.783	1158794	0.301		1001412	0.040
9/10/2003	0.10	4367302	1.435	2584121	0.779	1159095	0.286		1041176	0.037
9/11/2003	0.35	4368737	1.432	2584900	0.846	1159381	0.324		1078647	0.044
9/12/2003		4370169	1.734	2585746	1.009	1159705	0.451		1122171	0.050
9/13/2003	0.70		1.734		1.009		0.451			0.050
9/14/2003	0.40		1.734		1.009		0.451			0.050
9/15/2003	2.20	4375370	3.861	2588773	2.814	1161059	1.619	0.1434	1272092	0.249
9/16/2003		4379231	2.737	2591587	1.812	1162678	1.088		1521359	0.130
9/17/2003		4381968	1.976	2593399	1.210	1163766	0.591		1650946	0.066
9/18/2003	1.00	4383944	2.688	2594609	1.779	1164357	1.280		1716714	0.151
9/19/2003		4386632	2.391	2596388	1.499	1165637	0.684		1867299	0.077
9/20/2003			2.391		1.499		0.684			0.077
9/21/2003			2.391		1.499		0.684			0.077
9/22/2003		4393806	1.972	2600886	1.510	1167688	0.507		2099648	0.057
9/23/2003	1.30	4395778	3.994	2602396	2.568	1168195	1.687	0.0356	2156481	0.205
9/24/2003		4399772	2.490	2604964	1.374	1169882	0.686		2361358	0.085
9/25/2003		4402262	2.147	2606338	1.274	1170568	0.582		2446668	0.062
9/26/2003		4404409	2.650	2607612	1.729	1171150	0.865		2509023	0.099
9/27/2003	0.25		2.650		1.729		0.865			0.099
9/28/2003	1.25		2.650		1.729		0.865			0.099
9/29/2003		4412359	2.346	2612798	1.453	1173746	0.717		2807338	0.080
9/30/2003		4414705	2.121	2614251	1.264	1174463	0.615		2887380	0.060
10/1/2003		4416826	1.944	2615515	1.109	1175078	0.415		2947645	0.048
10/2/2003		4418770	1.837	2616624	1.045	1175493	0.441		2995215	0.044
10/3/2003		4420607	1.791	2617669	1.011	1175934	0.405		3038734	0.040
10/4/2003	0.10		1.791		1.011		0.405			0.040
10/5/2003			1.791		1.011		0.405			0.040
10/6/2003		4425979	1.698	2620702	0.878	1177149	0.362		3159995	0.044
10/7/2003		4427677	1.604	2621580	0.852	1177511	0.329		3203670	0.040
10/8/2003		4429281	1.541	2622432	0.844	1177840	0.323		3243707	0.034
10/9/2003		4430822	1.602	2623276	0.845	1178163	0.320		3277812	0.035
10/10/2003		4432424	1.531	2624121	0.836	1178483	0.312		3312525	0.039
10/11/2003			1.531		0.836		0.312			0.039
10/12/2003			1.531		0.836		0.312			0.039
10/13/2003			1.531		0.836		0.312			0.039
10/14/2003	1.40	4438548	2.348	2627465	1.545	1179730	0.806		3467419	0.103
10/15/2003		4440896	2.508	2629010	1.449	1180536	0.739		3570338	0.099
10/16/2003	0.10	4443404	1.593	2630459	1.076	1181275	0.520		3669765	0.060

TABLE 3-2

East Norriton Township

Pump Station Flows (mgd)

		Norris City Ave.		Timberlake		Germantown			Sandra Lane	
Date	Rainfall (in.)	Totalizer	Daily Flow	Totalizer	Daily Flow	Totalizer	Daily Flow	Overflow	Totalizer	Daily Flow
10/17/2003	0.30	4444997	1.986	2631535	1.190	1181795	0.567		3729721	0.062
10/18/2003			1.986		1.190		0.567			0.062
10/19/2003			1.986		1.190		0.567			0.062
10/20/2003		4450956	1.698	2635104	0.993	1183497	0.432		3915439	0.042
10/21/2003		4452654	1.650	2636097	0.894	1183929	0.389		3956997	0.040
10/22/2003		4454304	1.641	2636991	1.001	1184318	0.377		3997214	0.036
10/23/2003		4455945	1.750	2637992	0.851	1184695	0.393		4033450	0.040
10/24/2003		4457695	1.892	2638843	1.261	1185088	0.571		4073157	0.074
10/25/2003			1.892		1.261		0.571			0.074
10/26/2003	1.40		1.892		1.261		0.571	0.0502		0.074
10/27/2003	1.50	4463371	5.736	2642626	3.358	1186801	2.424	0.2875	4293925	0.425
10/28/2003		4469102	4.960	2646163	3.406	1189225	1.766	0.0502	4718977	0.289
10/29/2003	1.70	4474062	5.680	2649369	4.159	1190991	2.022	0.4934	5008259	0.296
10/30/2003		4479742	5.376	2653527	2.465	1193013	1.134		5304580	0.124
10/31/2003		4483318	2.655	2656492	1.512	1194147	0.716		5428982	0.076
11/1/2003			2.655		1.512		0.716			0.076
11/2/2003			2.655		1.512		0.716			0.076
11/3/2003		4491284	2.228	2661029	1.255	1196295	0.519		5656629	0.052
11/4/2003		4493512	2.065	2662284	1.247	1196814	0.486		5708367	0.047
11/5/2003		4495577	1.129	2663531	3.072	1197300	1.594	0.1066	5755181	0.247
11/6/2003		4499706	4.630	2666603	2.807	1198894	1.653		5971695	0.189
11/7/2003		4504336	3.115	2669410	2.060	1200547	0.936		6161160	0.105
11/8/2003			3.115		2.060		0.936			0.105
11/9/2003			3.115		2.060		0.936			0.105
11/10/2003		4513680	2.470	2675590	1.547	1203356	0.651		6475608	0.068
11/11/2003			2.470		1.547		0.651			0.068
11/12/2003		4518620	2.943	2678683	1.744	1204658	0.836		6611148	0.096
11/13/2003		4521563	2.501	2680427	1.522	1205494	0.705		6706934	0.080
11/14/2003		4524064	2.200	2681949	1.289	1206199	0.534		6786492	0.055
11/15/2003			2.200		1.289		0.534			0.055
11/16/2003			2.200		1.289		0.534			0.055
11/17/2003		4530663	2.024	2685816	1.143	1207802	0.473		6951968	0.049
11/18/2003		4532687	1.893	2686959	1.098	1208275	0.425		7000523	0.044
11/19/2003		4534580	4.627	2688057	4.349	1208700	1.636		7041205	0.286
11/20/2003		4539207	4.320	2691406	2.847	1210336	1.600		7330249	0.189
11/21/2003		4543527	2.818	2694247	1.739	1211936	0.806		7518852	0.087
11/22/2003			2.818		1.739		0.806			0.087
11/23/2003			2.818		1.739		0.806			0.087
11/24/2003		4551981	2.524	2699463	1.533	1214353	0.670		7780778	0.067
11/25/2003		4554505	2.361	2700996	1.406	1215023	0.605		7847776	0.065
11/26/2003		4556866	2.902	2702402	1.853	1215628	0.906		7912424	0.107
11/27/2003			2.902		1.853		0.906			0.107
11/28/2003			2.902		1.853		0.906	0.0386		0.107
11/29/2003			2.902		1.853		0.906	0.0064		0.107
11/30/2003			2.902		1.853		0.906			0.107
12/1/2003		4571378	2.436	2711669	1.460	1220156	0.646		8445406	0.067
12/2/2003		4573814	2.267	2713129	1.342	1220802	0.576		8512246	0.058
12/3/2003		4576081	2.099	2714471	1.174	1221378	0.471		8569898	0.046
12/4/2003		4578180	2.306	2715645	1.229	1221849	0.513		8615654	0.050
12/5/2003	0.50	4580486	2.137	2716874	1.241	1222362	0.501		8665202	0.052
12/6/2003	0.30		2.137		1.241		0.501			0.052
12/7/2003			2.137		1.241		0.501			0.052
12/8/2003		4586897	1.696	2720596	1.011	1223865	0.383		8822262	0.044
12/9/2003		4588593	1.922	2721607	1.262	1224248	0.468		8865956	0.046
12/10/2003	1.20	4590515	1.736	2722869	2.005	1224716	1.155	0.04	8918700	0.283
12/11/2003	0.30	4594773	5.583	2725923	3.675	1226261	2.021	0.2936	9197134	0.274
12/12/2003		4600356	3.889	2729598	2.551	1228282	1.267		9471340	0.153
12/13/2003			3.889		2.551		1.267			0.153
12/14/2003	1.20		3.889		2.551		1.267	0.057		0.153
12/15/2003		4612024	4.050	2737252	2.640	1232084	1.398	0.0126	9931530	0.117

TABLE 3-2

East Norriton Township

Pump Station Flows (mgd)

		Norris City Ave.		Timberlake		Germantown			Sandra Lane	
Date	Rainfall (in.)	Totalizer	Daily Flow	Totalizer	Daily Flow	Totalizer	Daily Flow	Overflow	Totalizer	Daily Flow
12/16/2003		4616074	3.294	2739892	2.215	1233482	0.929		10048775	0.156
12/17/2003	0.90	4619368	5.469	2742107	3.772	1234411	2.109	0.1115	10204773	0.258
12/18/2003		4624837	3.827	2745879	2.185	1236520	1.048		10462866	0.116
12/19/2003		4628664	2.931	2748064	1.812	1237568	0.769		10578829	0.080
12/20/2003			2.931		1.812		0.769			0.080
12/21/2003			2.931		1.812		0.769			0.080
12/22/2003		4637457	2.514	2753500	1.388	1239875	0.547		10820148	0.056
12/23/2003		4639971	2.610	2754888	1.430	1240422	0.767		10875687	0.084
12/24/2003	1.100	4642581	3.434	2756318	2.219	1241139	0.997		10959380	0.117
12/25/2003			3.434		2.219		0.997			0.117
12/26/2003			3.434		2.219		0.997			0.117
12/27/2003			3.434		2.219		0.997			0.117
12/28/2003			3.434		2.219		0.997			0.117
12/29/2003		4659751	2.482	2767412	1.450	1246173	0.568		11544197	0.054
12/30/2003	0.05	4662233	2.344	2768862	1.386	1246741	0.565		11598185	0.057
12/31/2003		4664577	2.344	2770248	1.386	1247306	0.565		11654742	0.057
Total	56.45									
Annual Avg. 2003			**2.360**		**1.431**		**0.657**			**0.085**
	Gravity to Sawmill PS		0.060							
	Total ENT annual ADF		2.420							
1/1/2004			2.181		1.208		0.445			0.050
1/2/2004		4668939	2.157	2772663	1.248	1248195	0.483		1744436	0.050
1/3/2004			2.157		1.248		0.483			0.050
1/4/2004			2.157		1.248		0.483			0.050
1/5/2004	0.60	4675411	2.991	2776406	1.964	1249643	0.980		1894456	0.121
1/6/2004		4678402	2.436	2778370	1.511	1250623	0.724		2015092	0.079
1/7/2004		4680838	2.197	2779881	1.226	1251347	0.516		2094425	0.063
1/8/2004		4683035	2.115	2781107	1.226	1251863	0.520		2157201	0.053
1/9/2004		4685150	2.016	2782333	1.150	1252383	0.457		2210527	0.047
1/10/2004			2.016		1.150		0.457			0.047
1/11/2004			2.016		1.150		0.457			0.047
1/12/2004		4691199	1.904	2785782	1.024	1253755	0.394		2350891	0.042
1/13/2004		4693103	1.804	2786806	1.011	1254149	0.362		2392526	0.041
1/14/2004		4694907	2.054	2787817	0.995	1254511	0.453		2433892	0.044
1/15/2004	0.20	4696961	1.513	2788812	0.918	1254964	0.304		2478252	0.040
1/16/2004		4698474	1.913	2789730	1.085	1255268	0.434		2518357	0.047
1/17/2004			1.913		1.085		0.434			0.047
1/18/2004	0.60		1.913		1.085		0.434			0.047
1/19/2004			1.913		1.085		0.434			0.047
1/20/2004		4706127	1.677	2794071	0.983	1257003	0.361		2705161	0.039
1/21/2004		4707804	1.715	2795054	0.883	1257364	0.331		2744623	0.034
1/22/2004		4709519	1.661	2795937	0.880	1257695	0.317		2779028	0.034
1/23/2004		4711180	1.738	2796817	0.924	1258012	0.341		2813467	0.038
1/24/2004			1.738		0.924		0.641			0.038
1/25/2004			1.738		0.924		0.341			0.038
1/26/2004	0.20	4716395	1.203	2799589	0.680	1259036	0.259		2928851	0.031
1/27/2004		4717598	1.737	2800269	0.908	1259295	0.325		2959999	0.039
1/28/2004	0.40	4719335	1.303	2801177	0.777	1259620	0.258		2999164	0.031
1/29/2004		4720638	1.531	2801954	0.766	1259878	0.296		3030120	0.032
1/30/2004		4722169	1.552	2802720	0.817	1260174	0.298		3062424	0.037
1/31/2004			1.552		0.817		0.298			0.037
2/1/2004			1.552		0.817		0.298			0.037
2/2/2004		4726825	1.478	2805171	0.677	1261068	0.300		3172055	0.037
2/3/2004	0.60	4728303	2.712	2805848	1.894	1261368	0.940		3209325	0.104
2/4/2004		4731015	2.418	2807742	1.484	1262308	0.804		3313300	0.100
2/5/2004		4733433	1.907	2809226	1.132	1263112	0.465		3413043	0.057
2/6/2004	1.80	4735340	4.046	2810358	2.664	1263577	1.440	YES ?? Mgd	3470350	0.191
2/7/2004			4.046		2.664		1.440			0.191
2/8/2004			4.046		2.664		1.440			0.191

TABLE 3-2

East Norriton Township

Pump Station Flows (mgd)

		Norris City Ave.		Timberlake		Germantown			Sandra Lane	
Date	Rainfall (in.)	Totalizer	Daily Flow	Totalizer	Daily Flow	Totalizer	Daily Flow	Overflow	Totalizer	Daily Flow
2/9/2004		4747479	2.374	2818351	1.403	1267897	0.664		4042232	0.074
2/10/2004		4749853	2.614	2819754	1.681	1268561	0.860		4116153	0.090
2/11/2004		4752467	2.193	2821435	1.263	1269421	0.592		4206118	0.063
2/12/2004		4754660	1.991	2822698	1.111	1270013	0.464		4269071	0.047
2/13/2004		4756651	1.927	2823809	1.109	1270477	0.471		4316184	0.047
2/14/2004			1.927		1.109		0.471			0.047
2/15/2004			1.927		1.109		0.471			0.047
2/16/2004			1.927		1.109		0.471			0.047
2/17/2004		4764358	1.706	2828246	0.917	1272360	0.394		4504929	0.040
2/18/2004		4766064	1.691	2829163	0.938	1272754	0.343		4545070	0.037
2/19/2004		4767755	1.719	2830101	0.983	1273097	0.407		4581840	0.039
2/20/2004		4769474	1.785	2831084	1.020	1273504	0.428		4620345	0.041
2/21/2004			1.785		1.020		0.428			0.041
2/22/2004			1.785		1.020		0.428			0.041
2/23/2004		4774828	1.662	2834143	0.876	1274789	0.445		4743929	0.033
2/24/2004		4776490	1.714	2835019	0.871	1275234	0.342		4776676	0.041
2/25/2004	0.10	4778204	1.651	2835890	1.030	1275576	0.371		4817359	0.035
2/26/2004		4779855	1.594	2836920	0.868	1275947	0.345		4852610	0.036
2/27/2004		4781449	1.638	2837788	0.898	1276292	0.392		4888852	0.038
2/28/2004			1.638		0.898		0.392			0.038
2/29/2004			1.638		0.898		0.392			0.038
3/1/2004		4786364	1.590	2840482	0.887	1277467	0.333		5003381	0.038
3/2/2004		4787954	1.594	2841369	0.894	1277800	0.377		5041013	0.038
3/3/2004	0.10	4789548	1.620	2842263	0.920	1278177	0.432		5078545	0.041
3/4/2004		4791168	1.683	2843183	0.942	1278609	0.398		5119054	0.038
3/5/2004		4792851	2.302	2844125	1.489	1279007	0.752		5156761	0.084
3/6/2004	0.40		2.302		1.489		0.752			0.084
3/7/2004			2.302		1.489		0.752			0.084
3/8/2004	0.40	4799757	2.427	2848593	1.592	1281264	0.798		5408095	0.094
3/9/2004		4802184	2.191	2850185	1.445	1282062	0.744		5502409	0.085
3/10/2004		4804375	2.047	2851630	1.210	1282806	0.562		5587845	0.064
3/11/2004		4806422	1.955	2852840	1.159	1283368	0.557		5651878	0.061
3/12/2004		4808377	1.846	2853999	1.070	1283925	0.472		5712405	0.049
3/13/2004			1.846		1.070		0.472			0.049
3/14/2004			1.846		1.070		0.472			0.049
3/15/2004		4813916	1.723	2857210	0.923	1285340	0.415		5858699	0.039
3/16/2004	0.70	4815639	2.454	2858133	1.651	1285755	0.730		5897844	0.077
3/17/2004		4818093	2.302	2859784	1.433	1286485	0.707		5974724	0.079
3/18/2004		4820395	3.863	2861217	2.743	1287192	1.418		6053461	0.204
3/19/2004	0.30	4824258	3.689	2863960	2.539	1288610	1.365		6257321	0.171
3/20/2004			3.689		2.539		1.365			0.171
3/21/2004			3.689		2.539		1.365			0.171
3/22/2004		4835326	2.443	2871577	1.233	1292705	0.603		6769187	0.077
3/23/2004		4837769	2.327	2872810	1.342	1293308	0.663		6846586	0.077
3/24/2004		4840096	2.188	2874152	1.295	1293971	0.554		6923215	0.044
3/25/2004		4842284	2.015	2875447	1.121	1294525	0.492		6967469	0.046
3/26/2004		4844299	2.075	2876568	1.185	1295017	0.532		7013789	0.051
3/27/2004	0.10		2.075		1.185		0.532			0.051
3/28/2004			2.075		1.185		0.532			0.051
3/29/2004		4850525	1.839	2880123	1.031	1296613	0.403		7167709	0.040
3/30/2004	0.90	4852364	2.750	2881154	1.987	1297016	0.917		7207513	0.101
3/31/2004		4855114	3.053	2883141	1.822	1297933	0.845		7308398	0.117
4/1/2004	0.15	4858167	2.786	2884963	1.726	1298778	0.840		7425275	0.106
4/2/2004	0.20	4860953	3.847	2886689	2.618	1299618	1.375		7531258	0.180
4/3/2004			3.847		2.618		1.375			0.180
4/4/2004	0.80		3.847		2.618		1.375			0.180
4/5/2004		4872493	3.228	2894544	2.092	1303744	1.055		8070706	0.132
4/6/2004		4875721	2.723	2896636	1.647	1304799	0.795		8202652	0.084
4/7/2004		4878444	2.494	2898283	1.469	1305594	0.545		8287035	0.066
4/8/2004	0.10	4880938	2.254	2899752	1.298	1306139	0.551		8352939	0.056

TABLE 3-2

East Norriton Township

Pump Station Flows (mgd)

		Norris City Ave.		Timberlake		Germantown			Sandra Lane	
Date	Rainfall (in.)	Totalizer	Daily Flow	Totalizer	Daily Flow	Totalizer	Daily Flow	Overflow	Totalizer	Daily Flow
4/9/2004			2.254		1.298		0.551			0.056
4/10/2004			2.254		1.298		0.551			0.056
4/11/2004			2.254		1.298		0.551			0.056
4/12/2004	1.10	4889953	3.651	2904942	2.738	1308343	1.374		8575150	0.169
4/13/2004	0.80	4893604	5.483	2907680	4.050	1309717	2.367	YES ?? Mgd	8744202	0.332
4/14/2004	1.00	4899087	6.082	2911730	3.752	1312084	2.060	YES ?? Mgd	9075826	0.313
4/15/2004		4905169	4.948	2915482	3.527	1314144	1.582		9388840	0.186
4/16/2004		4910117	3.317	2919009	1.932	1315726	0.824		9574420	0.088
4/17/2004			3.317		1.932		0.824			0.088
4/18/2004			3.317		1.932		0.824			0.088
4/19/2004		4920068	2.342	2924805	1.503	1318199	0.644		9837764	0.059
4/20/2004		4922410	2.392	2926308	1.408	1318843	0.502		9896672	0.048
4/21/2004		4924802	2.293	2927716	1.216	1319345	0.480		9944334	0.045
4/22/2004		4927095	2.180	2928932	1.220	1319825	0.399		9989816	0.036
4/23/2004	0.60	4929275	2.294	2930152	1.330	1320224	0.527		10026118	0.050
4/24/2004			2.294		1.330		0.527			0.050
4/25/2004	0.40		2.294		1.330		0.527			0.050
4/26/2004	0.80	4936158	4.117	2934142	2.976	1321806	1.450		10177320	0.185
4/27/2004	0.10	4940275	3.252	2937118	1.830	1323256	0.860		10362798	0.119
4/28/2004		4943527	2.650	2938948	1.514	1324116	0.645		10481512	0.076
4/29/2004		4946177	2.421	2940462	1.359	1324761	0.551		10557763	0.058
4/30/2004		4948598	2.280	2941821	1.296	1325312	0.498		10615909	0.051
5/1/2004			2.280		1.296		0.498			0.051
5/2/2004			2.280		1.296		0.498			0.051
5/3/2004	0.90	4955437	3.364	2945709	1.993	1326807	1.016		10769922	0.098
5/4/2004		4958801	2.229	2947702	1.566	1327823	0.717		10867459	0.082
5/5/2004	0.30	4961030	2.464	2949268	1.471	1328540	0.683		10949202	0.068
5/6/2004		4963494	2.271	2950739	1.248	1329223	0.533		11017389	0.055
5/7/2004		4965765	2.082	2951987	1.182	1329756	0.473		11072021	0.047
5/8/2004			2.082		1.182		0.473			0.047
5/9/2004			2.082		1.182		0.473			0.047
5/10/2004		4972012	1.978	2955534	1.082	1331176	0.412		11213324	0.039
5/11/2004		4973990	1.869	2956616	1.058	1331588	0.381		11252816	0.038
5/12/2004		4975859	1.819	2957674	0.937	1331969	0.365		11290777	0.039
5/13/2004		4977678	1.821	2958611	0.946	1332334	0.361		11330272	0.040
5/14/2004		4979499	1.839	2959557	1.009	1332695	0.394		11369774	0.041
5/15/2004	0.40		1.839		1.009		0.940			0.041
5/16/2004			1.839		1.009		0.394			0.041
5/17/2004		4985015	1.713	2962584	0.890	1333878	0.338		11493508	0.041
5/18/2004	0.20	4986728	1.788	2963474	1.004	1334216	0.383		11534770	0.040
5/19/2004	0.20	4988516	1.946	2964478	1.091	1334599	0.488		11574622	0.046
5/20/2004		4990462	1.758	2965569	0.981	1335087	0.384		11620756	0.038
5/21/2004	0.10	4992220	1.732	2966550	0.922	1335471	0.368		11659193	0.041
5/22/2004			1.732		0.922		0.368			0.041
5/23/2004			1.732		0.922		0.368			0.041
5/24/2004		4997416	1.616	2969315	0.854	1336575	0.328		11781613	0.036
5/25/2004	0.10	4999032	1.645	2970169	0.856	1336903	0.335		11817446	0.039
5/26/2004	0.20	5000677	1.682	2971025	0.907	1337238	0.372	YES ?? Mgd	11856096	0.036
5/27/2004		5002359	1.655	2971932	0.830	1337610	0.346		11892378	0.034
5/28/2004		5004014	1.639	2972762	0.895	1337956	0.365		11925992	0.040
5/29/2004			1.639		0.895		0.365			0.040
5/30/2004			1.639		0.895		0.365			0.040
5/31/2004	0.40		1.639		0.895		0.365			0.040
6/1/2004	0.30	5010569	1.662	2976342	0.874	1339414	0.354		12086033	0.039
6/2/2004		5012231	1.587	2977216	0.940	1339768	0.367		12125214	0.037
6/3/2004		5013818	1.546	2978156	0.725	1340135	0.299		12161739	0.036
6/4/2004		5015364	1.581	2978881	0.876	1340434	0.352	YES ?? Mgd	12197561	0.037
6/5/2004	0.10		1.581		0.876		0.352			0.037
6/6/2004			1.581		0.876		0.352			0.037
6/7/2004	0.30	5020108	1.539	2981510	0.843	1341491	0.332	YES ?? Mgd	12307471	0.040

TABLE 3-2

East Norriton Township

Pump Station Flows (mgd)

		Norris City Ave.		Timberlake		Germantown			Sandra Lane	
Date	Rainfall (in.)	Totalizer	Daily Flow	Totalizer	Daily Flow	Totalizer	Daily Flow	Overflow	Totalizer	Daily Flow
6/8/2004		5021647	1.495	2982353	0.836	1341823	0.323		12347072	0.036
6/9/2004		5023142	1.515	2983189	0.776	1342146	0.301		12383234	0.036
6/10/2004		5024657	1.446	2983965	0.741	1342447	0.283		12418954	0.033
6/11/2004		5026103	1.506	2984706	0.816	1342730	0.332		12451469	0.040
6/12/2004	3.00		1.506		0.816		0.332			0.040
6/13/2004			1.506		0.816		0.332			0.040
6/14/2004	1.10	5030622	1.488	2987154	0.801	1343725	0.302		12570838	0.038
6/15/2004		5032110	1.475	2987955	0.823	1344027	0.364		12609077	0.038
6/16/2004		5033585	1.464	2988778	0.678	1344391	0.276		12646854	0.034
6/17/2004		5035049	1.452	2989456	0.840	1344667	0.275		12681148	0.034
6/18/2004	0.90	5036501	1.434	2990296	0.762	1344942	0.296		12715644	0.036
6/19/2004			1.434		0.762		0.296			0.036
6/20/2004			1.434		0.762		0.296			0.036
6/21/2004		5040804	1.374	2992583	0.757	1345831	0.292		12825064	0.037
6/22/2004		5042178	1.515	2993340	0.856	1346123	0.372		12861905	0.040
6/23/2004		5043693	1.432	2994196	0.772	1346495	0.303		12902100	0.037
6/24/2004	1.20	5045125	1.205	2994968	0.721	1346798	0.324		12939565	0.037
6/25/2004		5046330	1.507	2995689	0.769	1347122	0.316		12976269	0.035
6/26/2004			1.507		0.769		0.316			0.035
6/27/2004	2.00		1.507		0.769		0.316			0.035
6/28/2004	1.10	5050850	1.360	2997995	0.804	1348069	0.322		13081578	0.039
6/29/2004		5052210	1.419	2998799	0.884	1348391	0.411		13120756	0.046
6/30/2004	0.50	5053629	1.352	2999683	0.607	1348802	0.227		13166467	0.031
7/1/2004	0.30	5054981	1.387	3000290	0.760	1349029	0.308		13197051	0.031
7/2/2004		5056368	1.332	3001050	0.743	1349337	0.304		13228107	0.035
7/3/2004			1.332		0.743		0.304			0.035
7/4/2004			1.332		0.743		0.304			0.035
7/5/2004	0.10		1.332		0.743		0.304			0.035
7/6/2004		5061695	1.336	3004021	0.713	1350551	0.306		13366849	0.036
7/7/2004	0.30	5063031	1.406	3004734	0.797	1350857	0.328		13402357	0.032
7/8/2004		5064437	1.398	3005531	0.715	1351185	0.323		13434424	0.036
7/9/2004		5065835	1.353	3006246	0.722	1351508	0.318		13470614	0.037
7/10/2004			1.353		0.722		0.318			0.037
7/11/2004			1.353		0.722		0.318			0.037
7/12/2004	3.00	5069894	3.457	3008413	2.494	1352463	1.348	YES ?? Mgd	13580521	0.219
7/13/2004		5073351	1.866	3010907	1.097	1353811	0.578		13799353	0.078
7/14/2004	1.10	5075217	2.488	3012004	1.707	1354389	1.015		13876909	0.130
7/15/2004		5077705	2.043	3013711	2.244	1355404	0.601		14007066	0.083
7/16/2004		5079748	1.913	3015955	0.704	1356005	0.570		14089894	0.063
7/17/2004			1.913		0.704		0.570			0.063
7/18/2004	0.90		1.913		0.704		0.570			0.063
7/19/2004		5085486	2.006	3018066	1.277	1357716	0.642		14279134	0.084
7/20/2004		5087492	1.690	3019343	0.883	1358358	0.451		14363323	0.045
7/21/2004		5089182	1.642	3020226	0.869	1358809	0.390		14408440	0.039
7/22/2004		5090824	1.544	3021095	0.861	1359199	0.363		14447764	0.042
7/23/2004		5092368	2.382	3021956	1.606	1359562	0.981		14489402	0.092
7/24/2004	1.20		2.382		1.606		0.981	YES ?? Mgd		0.092
7/25/2004			2.382		1.606		0.981			0.092
7/26/2004		5099515	1.764	3026774	1.006	1362506	0.461		14765648	0.050
7/27/2004	2.00	5101279	3.982	3027780	2.602	1362967	1.303	YES ?? Mgd	14815153	0.206
7/28/2004	1.10	5105261	4.473	3030382	3.487	1364270	2.161	YES ?? Mgd	15021497	0.305
7/29/2004		5109734	3.451	3033869	2.046	1366431	1.276		15326434	0.154
7/30/2004		5113185	3.723	3035915	2.575	1367707	1.334		15480508	0.195
7/31/2004	0.50		3.723		2.575		1.334			0.195
8/1/2004	3.00		3.723		2.575		1.334	YES ?? Mgd		0.195
8/2/2004		5124354	3.440	3043639	2.232	1371709	1.087		16066957	0.134
8/3/2004		5127794	2.520	3045871	1.435	1372796	0.662		16200536	0.074
8/4/2004	0.10	5130314	2.354	3047306	1.358	1373458	0.616		16274902	0.057
8/5/2004		5132668	2.127	3048664	1.173	1374074	0.492		16331929	0.046
8/6/2004		5134795	1.869	3049837	1.027	1374566	0.407		16377549	0.040

TABLE 3-2

East Norriton Township

Pump Station Flows (mgd)

		Norris City Ave.		Timberlake		Germantown			Sandra Lane	
Date	Rainfall (in.)	Totalizer	Daily Flow	Totalizer	Daily Flow	Totalizer	Daily Flow	Overflow	Totalizer	Daily Flow
8/7/2004			1.869		1.027		0.407			0.040
8/8/2004			1.869		1.027		0.407			0.040
8/9/2004		5140402	1.767	3052919	0.924	1375788	0.380		16497898	0.042
8/10/2004		5142169	1.649	3053843	0.899	1376168	0.313		16539997	0.036
8/11/2004	0.10	5143818	1.680	3054742	0.897	1376481	0.462		16575943	0.036
8/12/2004		5145498	1.667	3055639	0.863	1376943	0.351		16612225	0.037
8/13/2004	0.20	5147165	1.648	3056502	0.906	1377294	0.407		16648728	0.038
8/14/2004	0.10		1.648		0.906		0.407			0.038
8/15/2004			1.648		0.906		0.407			0.038
8/16/2004		5152108	1.643	3059220	0.898	1378514	0.290		16763402	0.036
8/17/2004		5153751	1.564	3060118	0.824	1378804	0.356		16799191	0.037
8/18/2004		5155315	1.470	3060942	0.729	1379160	0.299		16836293	0.033
8/19/2004		5156785	1.515	3061671	0.762	1379459	0.295		16869313	0.033
8/20/2004		5158300	1.619	3062433	0.898	1379754	0.368		16902587	0.039
8/21/2004	0.60		1.619		0.898		0.368			0.039
8/22/2004			1.619		0.898		0.368			0.039
8/23/2004		5163158	1.550	3065128	0.701	1380858	0.359		17019331	0.039
8/24/2004		5164708	1.809	3065829	0.981	1381217	0.357		17058800	0.040
8/25/2004		5166517	1.089	3066810	0.658	1381574	0.248		17098918	0.026
8/26/2004		5167606	1.406	3067468	0.807	1381822	0.269		17125051	0.030
8/27/2004		5169012	1.453	3068275	0.751	1382091	0.303		17155280	0.037
8/28/2004			1.453		0.751		0.303			0.037
8/29/2004			1.453		0.751		0.303			0.037
8/30/2004	1.20	5173372	1.838	3070527	2.166	1383001	0.522		17265501	0.054
8/31/2004		5175210	1.661	3072693	-	1383523	0.513		17319572	0.057
9/1/2004		5176871	1.533	3072693	0.751	1384036	0.316		17376078	0.042
9/2/2004		5178404	1.436	3073444	0.793	1384352	0.323		17418076	0.030
9/3/2004		5179840	1.420	3074237	0.767	1384675	0.320		17448076	0.037
9/4/2004			1.420		0.767		0.320			0.037
9/5/2004			1.420		0.767		0.320			0.037
9/6/2004			1.420		0.767		0.320			0.037
9/7/2004		5185521	1.386	3077305	0.750	1385955	0.323		17594914	0.036
9/8/2004	0.30	5186907	1.562	3078055	0.871	1386278	0.361		17631194	0.041
9/9/2004	0.05	5188469	1.482	3078926	0.810	1386639	0.344		17672354	0.034
9/10/2004		5189951	1.429	3079736	0.765	1386983	0.371		17706117	0.037
9/11/2004			1.429		0.765		0.371			0.037
9/12/2004			1.429		0.765		0.371			0.037
9/13/2004		5194238	1.386	3082031	0.764	1388097	0.296		17818360	0.036
9/14/2004		5195624	1.353	3082795	0.730	1388393	0.309		17854475	0.043
9/15/2004		5196977	1.365	3083525	0.727	1388702	0.290		17897847	0.030
9/16/2004		5198342	1.357	3084252	0.717	1388992	0.301		17928036	0.036
9/17/2004		5199699	2.651	3084969	1.778	1389293	0.967		17963865	0.143
9/18/2004	3.20		2.651		1.778		0.967			0.143
9/19/2004			2.651		1.778		0.967			0.143
9/20/2004		5207653	1.761	3090302	1.019	1392195	0.512		18392396	0.051
9/21/2004		5209414	1.662	3091321	0.967	1392707	0.460		18443014	0.046
9/22/2004		5211076	1.569	3092288	0.880	1393167	0.401		18488666	0.042
9/23/2004		5212645	1.535	3093168	0.854	1393568	0.371		18530264	0.040
9/24/2004		5214180	1.499	3094022	0.821	1393939	0.358		18569818	0.038
9/25/2004			1.499		0.821		0.358			0.038
9/26/2004			1.499		0.821		0.358			0.038
9/27/2004	0.10	5218678	1.452	3096485	0.793	1395013	0.332		18683324	0.035
9/28/2004	6.40	5220130	5.187	3097278	3.664	1395345	1.792	YES ?? Mgd	18718204	0.399
9/29/2004		5225317	4.883	3100942	3.279	1397137	1.770		19117212	0.241
9/30/2004	0.20	5230200	3.720	3104221	1.820	1398907	0.932		19358392	0.101
10/1/2004		5234305	3.591	3106041	1.356	1399839	0.684		19459432	0.063
10/2/2004			3.591		1.356		0.684			0.063
10/3/2004			3.591		1.356		0.684			0.063
10/4/2004		5245078	1.986	3110109	1.099	1401890	0.428		19648864	0.040
10/5/2004		5247064	1.871	3111208	1.012	1402318	0.441		19689222	0.042

TABLE 3-2

East Norriton Township

Pump Station Flows (mgd)

		Norris City Ave.		Timberlake		Germantown			Sandra Lane	
Date	Rainfall (in.)	Totalizer	Daily Flow	Totalizer	Daily Flow	Totalizer	Daily Flow	Overflow	Totalizer	Daily Flow
10/6/2004		5248935	1.809	3112220	0.952	1402759	0.382		19731424	0.041
10/7/2004		5250744	1.694	3113172	0.842	1403141	0.337		19772068	0.038
10/8/2004		5252438	1.691	3114014	0.968	1403478	0.374		19809806	0.041
10/9/2004			1.691		0.968		0.374			0.041
10/10/2004			1.691		0.968		0.374			0.041
10/11/2004			1.691		0.968		0.374			0.041
10/12/2004		5259203	1.542	3117887	0.652	1404973	0.261		19975674	0.036
10/13/2004		5260745	1.613	3118539	0.996	1405234	0.403		20011919	0.035
10/14/2004	0.80	5262358	2.063	3119535	1.137	1405637	0.496		20046698	0.052
10/15/2004		5264421	1.763	3120672	0.998	1406133	0.400		20098832	0.044
10/16/2004	0.35		1.763		0.998		0.400			0.044
10/17/2004			1.763		0.998		0.400			0.044
10/18/2004		5269711	1.791	3123666	1.078	1407333	0.565		20230662	0.045
10/19/2004	0.70	5271502	2.216	3124744	1.389	1407898	0.703		20275746	0.072
10/20/2004		5273718	1.883	3126133	1.023	1408601	0.469		20347542	0.051
10/21/2004		5275601	1.778	3127156	1.018	1409070	0.454		20398724	0.045
10/22/2004		5277379	1.720	3128174	0.954	1409524	0.414		20443343	0.043
10/23/2004			1.720		0.954		0.414			0.043
10/24/2004			1.720		0.954		0.414			0.043
10/25/2004		5282539	1.605	3131036	0.888	1410765	0.366		20571047	0.039
10/26/2004		5284144	1.557	3131924	0.877	1411131	0.356		20609895	0.039
10/27/2004		5285701	1.544	3132801	0.847	1411487	0.341		20649288	0.035
10/28/2004		5287245	1.523	3133648	0.827	1411828	0.332		20684095	0.035
10/29/2004	0.40	5288768	1.705	3134475	0.984	1412160	0.430		20719375	0.043
10/30/2004			1.705		0.984		0.430			0.043
10/31/2004			1.705		0.984		0.430			0.043
11/1/2004		5293882	1.595	3137426	0.879	1413450	0.362		20848127	0.036
11/2/2004		5295477	1.525	3138305	0.873	1413812	0.364		20884502	0.039
11/3/2004		5297002	1.514	3139178	0.823	1414176	0.330		20923040	0.036
11/4/2004	1.20	5298516	3.152	3140001	2.177	1414506	1.157		20959072	0.147
11/5/2004		5301668	2.089	3142178	1.253	1415663	0.683		21105687	0.076
11/6/2004			2.089		1.253		0.683			0.076
11/7/2004			2.089		1.253		0.683			0.076
11/8/2004		5307934	1.754	3145936	1.051	1417711	0.446		21332922	0.047
11/9/2004		5309688	1.687	3146987	0.964	1418157	0.432		21380030	0.042
11/10/2004		5311375	1.646	3147951	0.900	1418589	0.372		21422479	0.041
11/11/2004			1.646		0.900		0.372			0.041
11/12/2004	1.30	5314667	3.218	3149751	2.171	1419332	1.234		21504366	0.155
11/13/2004			3.218		2.171		1.234			0.155
11/14/2004			3.218		2.171		1.234			0.155
11/15/2004		5324320	2.143	3156265	1.204	1423033	0.638		21967927	0.067
11/16/2004		5326463	1.958	3157469	1.192	1423671	0.582		22034862	0.057
11/17/2004		5328421	1.886	3158661	1.053	1424253	0.445		22092243	0.044
11/18/2004		5330307	1.819	3159714	1.007	1424698	0.460		22135998	0.043
11/19/2004		5332126	1.906	3160721	1.105	1425158	0.499		22179319	0.048
11/20/2004	0.30		1.906		1.105		0.499			0.048
11/21/2004			1.906		1.105		0.499			0.048
11/22/2004		5337845	1.800	3164036	1.010	1426656	0.460		22324422	0.048
11/23/2004		5339645	1.782	3165046	1.014	1427116	0.452		22372730	0.045
11/24/2004	0.30	5341427	2.917	3166060	1.944	1427568	1.005		22417697	0.143
11/25/2004			2.917		1.944		1.005			0.143
11/26/2004			2.917		1.944		1.005	YES ?? Mgd		0.143
11/27/2004			2.917		1.944		1.005			0.143
11/28/2004	2.75		2.917		1.944		1.005			0.143
11/29/2004		5356010	3.428	3175782	2.189	1432595	1.337		23133482	0.135
11/30/2004		5359438	3.172	3177971	1.802	1433932	0.850		23268370	0.093
12/1/2004	0.85	5362610	4.345	3179773	3.270	1434782	1.701	YES ?? Mgd	23361764	0.241
12/2/2004		5366955	3.116	3183043	1.783	1436483	0.954		23602833	0.111
12/3/2004		5370071	2.539	3184826	1.497	1437437	0.685		23714196	0.068
12/4/2004			2.539		1.497		0.685			0.068

TABLE 3-2

East Norriton Township

Pump Station Flows (mgd)

		Norris City Ave.		Timberlake		Germantown			Sandra Lane	
Date	Rainfall (in.)	Totalizer	Daily Flow	Totalizer	Daily Flow	Totalizer	Daily Flow	Overflow	Totalizer	Daily Flow
12/5/2004			2.539		1.497		0.685			0.068
12/6/2004		5377689	2.234	3189316	1.355	1439492	0.594		23916762	0.053
12/7/2004	0.75	5379923	3.575	3190671	2.499	1440086	1.306		23969999	0.163
12/8/2004		5383498	2.874	3193170	1.767	1441392	0.940		24132817	0.113
12/9/2004	0.80	5386372	4.067	3194937	2.906	1442332	1.564	YES ?? Mgd	24245665	0.195
12/10/2004	0.35	5390439	4.055	3197843	2.647	1443896	1.420	YES ?? Mgd	24440971	0.174
12/11/2004			4.055		2.647		1.420			0.174
12/12/2004			4.055		2.647		1.420			0.174
12/13/2004		5402605	2.691	3205784	1.631	1448155	0.731		24962206	0.074
12/14/2004		5405296	2.480	3207415	1.408	1448886	0.619		25035836	0.058
12/15/2004		5407776	2.265	3208823	1.299	1449505	0.531		25093585	0.051
12/16/2004		5410041	2.220	3210122	1.277	1450036	0.557		25144487	0.051
12/17/2004		5412261	2.123	3211399	1.202	1450593	0.494		25195251	0.046
12/18/2004			2.123		1.202		0.494			0.046
12/19/2004			2.123		1.202		0.494			0.046
12/20/2004		5418630	1.939	3215006	1.088	1452076	0.400		25332268	0.042
12/21/2004		5420569	1.870	3216094	1.033	1452476	0.431		25374349	0.040
12/22/2004		5422439	1.865	3217127	1.006	1452907	0.377		25414725	0.038
12/23/2004	0.90	5424304	2.780	3218133	1.788	1453284	0.935		25453059	0.108
12/24/2004			2.780		1.788		0.935			0.108
12/25/2004			2.780		1.788		0.935			0.108
12/26/2004	0.30		2.780		1.788		0.935			0.108
12/27/2004		5435422	1.908	3225286	1.155	1457025	0.548		25883125	0.053
12/28/2004		5437330	2.034	3226441	1.180	1457573	0.450		25935975	0.046
12/29/2004		5439364	1.979	3227621	1.107	1458023	0.470		25981639	0.047
12/30/2004		**5441343**	**1.900**	**3228728**	**1.100**	**1458493**	**0.400**		**26028921**	**0.040**
12/31/2004			**1.900**		**1.100**		**0.400**			**0.040**
Total	64.85									
Annual Avg. 2004			**2.126**		**1.255**		**0.580**			**0.067**
Max. Daily 2004		4/14/2004	**6.082**	4/13/2004	**4.050**	4/13/2004	**2.367**		9/28/2004	**0.399**
Peak Factor			**2.861**		**3.226**		**4.079**			**5.980**
	Average annual ADF		2.126							
	Gravity to Sawmill PS		0.060							
	Total ENT annual ADF		**2.186**							

TABLE 4-1

East Norriton Township

Sanitary Sewer Needs for Act 537 Growth Areas

Zoning District	Avg. EDU/ Gross Acre	Undeveloped Growth Area Gross Acres*	Undeveloped Growth Area Potential EDU**	Public Sewered Growth Area Planned EDU	Total Growth Area Total EDU**	Growth Area Potential GPD***
Germantown Pump Station Area:						
AR	3.0	181	543	17	560	154,000
ARC	2.5	1	3	-	3	825
BP	11.0	5	60	-	60	16,500
BR	2.5	-	0	35	35	9,625
C	7.0	23	164	10	174	47,850
I	2.5	24	59	5	64	17,600
IN	5.0	8	39	5	44	12,100
LI	1.5	5	8	10	18	4,950
RO	2.0	3	6	-	6	1,650
RP	3.5	4	14	-	14	3,850
RR	8.5	----	0	56	56	15,400
SUB TOTAL			896	138	1,034	284,350
Timberlake Pump Station Area:						
AR	3.0	28	84	1	85	23,375
ARC	2.5	8	19	28	47	12,925
BP	11.0	2	18	23	41	11,275
BR	2.5	0.4	1	-	1	275
BR1	3.5	-	0	8	8	2,200
I	2.5	4	11	10	21	5,775
SUB TOTAL			133	70	203	55,825
Norris City Pump Station Area:						
AR	3.0	23.7	71	-	71	19,525
BP	11.0	2.5	27	-	27	7,425
BR	11.0	3.5	39	2	41	11,275
C	7.0	4.7	33	6	39	10,725
C1	8.0	0.6	5	-	5	1,375
EC	4.0	----	0	28	28	7,700
HR	16.0	----	0	40	40	11,000
IN	5.0	----	0	16	16	4,400
RP	3.5	2.0	7	-	7	1,925
RR	8.5	----	0	50	50	13,750
SUB TOTAL			182	142	324	89,100
Sawmill Pump Station Area:						
AR	3.0	10.7	32	-	32	8,800
BR	11.0	7.4	81	2	83	22,825
C	7.0	2.1	15	17	32	8,800
EC	4.0	----	0	4	4	1,100
EC2	5.0	----	0	64	64	17,600
IN	5.0	1.2	6	-	6	1,650
MR	5.5	0.4	2	-	2	550
RO	2.0	3.0	6	-	6	1,650
RR	8.5	----	0	66	66	18,150
SUB TOTAL			142	153	295	81,125
TOTAL			1,353	503	1,856	

TOTAL GROWTH AREA POTENTIAL AVERAGE ANNUAL FLOW	510,400
HISTORICAL AVERAGE ANNUAL FLOW (2002-2004 TABLE 3-2)	2,116,700
TOTAL PROJECTED AVERAGE ANNUAL FLOW	2,627,100
TOTAL PROJECTED AVERAGE ANNUAL FLOW (ROUNDED mgd)	**2.70**

NOTES:

* Growth areas are indicated on the Official Act 537 Plan dated October 2005.

** Growth area potential EDU's based on respective zoning district's average EDU per gross acre.

*** Growth Area Potential gpd based on 275 gpd / EDU.

TABLE 4-2

Potential Growth of Land Connected to Public Sewer

11/7/05

Zoning	Block/Unit	Public Sanitary	Acres	EDU/Acre	Potential EDU	Drainage Area
AR	004D001	Connect -10 year	1.5	3	4.5	GERMANTOWN
AR	1046	Connect -10 year	2.3	3	6.9	GERMANTOWN
AR	1015	Connect -10 year	1.1	3	3.3	GERMANTOWN
AR	1048	Connect -10 year	2.3	3	7	GERMANTOWN
AR	004D007	Connect -10 year	0.6	3	1.8	GERMANTOWN
AR	1008	Connect -10 year	0.7	3	2.2	GERMANTOWN
AR	004D054	Connect -10 year	0.5	3	1.6	GERMANTOWN
AR	003M079	Connect -10 year	1.0	3	2.9	GERMANTOWN
AR	1007	Connect -10 year	1.1	3	3.4	GERMANTOWN
AR	004D012	Connect -10 year	1.1	3	3.3	GERMANTOWN
AR	004D022	Connect -10 year	1.3	3	3.9	GERMANTOWN
AR	004D048	Connect -10 year	0.8	3	2.5	GERMANTOWN
AR	004D019	Connect -10 year	0.4	3	1.3	GERMANTOWN
AR	4002	Connect -10 year	1.3	3	3.8	GERMANTOWN
AR	4078	Connect -10 year	3.0	3	9.1	SANDRA
AR	4003	Connect -10 year	1.5	3	4.5	GERMANTOWN
AR	4004	Connect -10 year	1.2	3	3.7	GERMANTOWN
AR	4086	Connect -10 year	1.5	3	4.3	SANDRA
AR	4005	Connect -10 year	1.2	3	3.5	GERMANTOWN
AR	4052	Connect -10 year	2.5	3	7.4	SANDRA
AR	4012	Connect -10 year	1.2	3	3.7	GERMANTOWN
AR	4006	Connect -10 year	1.2	3	3.7	GERMANTOWN
AR	4007	Connect -10 year	1.7	3	5	SANDRA
AR	4034	Connect -10 year	2.0	3	6.1	SANDRA
AR	4065	Connect -10 year	1.0	3	3	SANDRA
AR	4080	Connect -10 year	1.1	3	3.3	SANDRA
AR	4083	Connect -10 year	0.7	3	2.1	SANDRA
AR	4033	Connect -10 year	1.3	3	3.8	SANDRA
AR	4029	Connect -10 year	1.8	3	5.3	SANDRA
AR	4054	Connect -10 year	0.7	3	2.1	SANDRA
AR	4061	Connect -10 year	0.9	3	2.7	SANDRA
AR	4085	Connect -10 year	0.8	3	2.4	SANDRA
AR	4028	Connect -10 year	0.9	3	2.7	SANDRA
AR	4048	Connect -10 year	0.9	3	2.8	SANDRA
AR	4027	Connect -10 year	1.4	3	4.3	SANDRA
AR	4026	Connect -10 year	5.8	3	17.3	SANDRA
AR	4076	Connect -10 year	0.6	3	1.7	SANDRA
AR	003F002	Connect -10 year	1.6	3	4.7	GERMANTOWN
AR	4025	Connect -10 year	1.0	3	3	SANDRA
AR	4096	Connect -10 year	0.6	3	1.8	SANDRA
AR	4062	Connect -10 year	0.6	3	1.7	SANDRA
AR	4063	Connect -10 year	0.6	3	1.8	SANDRA
AR	4016	Connect -10 year	3.3	3	9.8	GERMANTOWN
AR	4067	Connect -10 year	0.6	3	1.7	SANDRA
AR	003E013	Connect -10 year	1.1	3	3.2	GERMANTOWN
AR	4068	Connect -10 year	0.6	3	1.7	SANDRA
AR	4017	Connect -10 year	1.7	3	5	GERMANTOWN
AR	4018	Connect -10 year	1.5	3	4.6	GERMANTOWN
AR	003E012	Connect -10 year	1.1	3	3.3	GERMANTOWN
AR	4070	Connect -10 year	0.7	3	2.2	SANDRA
AR	003E017	Connect -10 year	1.7	3	5	SANDRA
AR	4071	Connect -10 year	0.6	3	1.8	SANDRA
AR	003E005	Connect -10 year	0.3	3	1	SANDRA
AR	4072	Connect -10 year	0.4	3	1.1	SANDRA
AR	4044	Connect -10 year	1.0	3	2.9	SANDRA
AR	003E007	Connect -10 year	0.4	3	1.1	SANDRA
AR	4073	Connect -10 year	0.4	3	1.1	SANDRA

TABLE 4-2

Potential Growth of Land Connected to Public Sewer

11/7/05

Zoning	Block/Unit	Public Sanitary	Acres	EDU/Acre	Potential EDU	Drainage Area
AR	4000	Connect -10 year	0.8	3	2.4	SANDRA
AR	4075	Connect -10 year	0.3	3	1	SANDRA
AR	4023	Connect -10 year	0.4	3	1.1	SANDRA
AR	4090	Connect -10 year	0.4	3	1.1	SANDRA
AR	4079	Connect -10 year	0.4	3	1.3	SANDRA
AR	003B002	Connect -10 year	0.9	3	2.7	GERMANTOWN
AR	003C012	Connect -10 year	1.6	3	4.7	GERMANTOWN
AR	003C005	Connect -10 year	0.5	3	1.4	GERMANTOWN
AR	003A007	Connect -10 year	0.9	3	2.8	SANDRA
AR	003A008	Connect -10 year	0.9	3	2.7	SANDRA
AR	003A009	Connect -10 year	0.9	3	2.6	SANDRA
AR	003A010	Connect -10 year	0.8	3	2.5	SANDRA
AR	003A012	Connect -10 year	1.0	3	2.9	SANDRA
AR	003A013	Connect -10 year	0.4	3	1.3	SANDRA
AR	003A015	Connect -10 year	1.0	3	2.9	SANDRA
AR	003A014	Connect -10 year	0.5	3	1.6	SANDRA
AR	003E015	Connect -10 year	2.2	3	6.7	GERMANTOWN
AR	1000	Connect Ultimate	1.9	3	5.8	GERMANTOWN
AR	1044	Connect Ultimate	1.1	3	3.2	GERMANTOWN
AR	003C017	Connect Ultimate	3.5	3	10.5	GERMANTOWN
AR	26064	Connect Ultimate	0.2	3	1	GERMANTOWN
AR	26148	Connect Ultimate	1.1	3	3.4	GERMANTOWN
AR	1008	OLDS to Public	0.7	3	2.2	GERMANTOWN
AR	1011	OLDS to Public	2.5	3	7.5	GERMANTOWN
AR	1052	OLDS to Public	2.5	3	7.6	GERMANTOWN
AR	1021	OLDS to Public	1.1	3	3.4	GERMANTOWN
AR	1020	OLDS to Public	1.0	3	2.9	GERMANTOWN
AR	1019	OLDS to Public	1.1	3	3.4	GERMANTOWN
AR	1000	OLDS to Public	2.0	3	5.9	GERMANTOWN
AR	1018	OLDS to Public	1.1	3	3.3	GERMANTOWN
AR	1017	OLDS to Public	1.1	3	3.2	GERMANTOWN
AR	1054	OLDS to Public	3.1	3	9.2	GERMANTOWN
AR	1042	OLDS to Public	1.2	3	3.7	GERMANTOWN
AR	1051	OLDS to Public	3.0	3	8.9	GERMANTOWN
AR	1061	OLDS to Public	2.7	3	8	GERMANTOWN
AR	1053	OLDS to Public	2.4	3	7.2	GERMANTOWN
AR	1049	OLDS to Public	2.4	3	7.2	GERMANTOWN
AR	004D011	OLDS to Public	0.5	3	1.4	GERMANTOWN
AR	003M001	OLDS to Public	0.4	3	1.2	GERMANTOWN
AR	1060	OLDS to Public	1.0	3	2.9	GERMANTOWN
AR	004D013	OLDS to Public	1.1	3	3.3	GERMANTOWN
AR	004D014	OLDS to Public	1.7	3	5	GERMANTOWN
AR	004D015	OLDS to Public	1.7	3	5	GERMANTOWN
AR	004D016	OLDS to Public	1.1	3	3.2	GERMANTOWN
AR	004D048	OLDS to Public	0.8	3	2.5	GERMANTOWN
AR	004D049	OLDS to Public	0.8	3	2.5	GERMANTOWN
AR	004D017	OLDS to Public	0.4	3	1.3	GERMANTOWN
AR	004D018	OLDS to Public	0.4	3	1.2	GERMANTOWN
AR	004D056	OLDS to Public	0.4	3	1.3	GERMANTOWN
AR	004D057	OLDS to Public	0.4	3	1.2	GERMANTOWN
AR	4001	OLDS to Public	1.3	3	3.9	GERMANTOWN
AR	4011	OLDS to Public	1.9	3	5.8	GERMANTOWN
AR	4008	OLDS to Public	1.2	3	3.5	GERMANTOWN
AR	4077	OLDS to Public	1.2	3	3.5	GERMANTOWN
AR	4082	OLDS to Public	0.6	3	1.7	GERMANTOWN
AR	003F010	OLDS to Public	1.3	3	4	GERMANTOWN
AR	003F009	OLDS to Public	1.4	3	4.2	GERMANTOWN

TABLE 4-2

Potential Growth of Land Connected to Public Sewer

11/7/05

Zoning	Block/Unit	Public Sanitary	Acres	EDU/Acre	Potential EDU	Drainage Area
AR	003F008	OLDS to Public	1.1	3	3.3	GERMANTOWN
AR	003F007	OLDS to Public	1.1	3	3.3	GERMANTOWN
AR	003F006	OLDS to Public	1.6	3	4.8	GERMANTOWN
AR	003F005	OLDS to Public	1.6	3	4.9	GERMANTOWN
AR	003F004	OLDS to Public	1.7	3	5.1	GERMANTOWN
AR	003F003	OLDS to Public	1.8	3	5.3	GERMANTOWN
AR	004H016	OLDS to Public	1.3	3	4	GERMANTOWN
AR	4095	OLDS to Public	1.4	3	4.3	GERMANTOWN
AR	4015	OLDS to Public	2.1	3	6.4	GERMANTOWN
AR	4019	OLDS to Public	0.5	3	1.5	SANDRA
AR	003E008	OLDS to Public	1.7	3	5.1	SANDRA
AR	003F001	OLDS to Public	0.3	3	1	GERMANTOWN
AR	4045	OLDS to Public	2.0	3	6.1	GERMANTOWN
AR	003E006	OLDS to Public	0.6	3	1.8	SANDRA
AR	4051	OLDS to Public	1.9	3	5.6	GERMANTOWN
AR	003E004	OLDS to Public	0.5	3	1.6	SANDRA
AR	4043	OLDS to Public	1.0	3	3	SANDRA
AR	003C005	OLDS to Public	0.3	3	1	GERMANTOWN
AR	003C004	OLDS to Public	0.4	3	1.2	GERMANTOWN
AR	3.00E+03	OLDS to Public	0.5	3	1.5	SANDRA
AR	4084	OLDS to Public	1.6	3	4.7	SANDRA
AR	003C002	OLDS to Public	1.4	3	4.2	GERMANTOWN
AR	003C008	OLDS to Public	1.0	3	3.1	GERMANTOWN
AR	003E002	OLDS to Public	0.6	3	1.7	SANDRA
AR	003C009	OLDS to Public	1.5	3	4.6	GERMANTOWN
AR	003C010	OLDS to Public	1.8	3	5.4	GERMANTOWN
AR	003C011	OLDS to Public	1.2	3	3.5	GERMANTOWN
AR	003C013	OLDS to Public	0.6	3	1.7	GERMANTOWN
AR	003C014	OLDS to Public	0.5	3	1.5	GERMANTOWN
AR	003A003	OLDS to Public	0.5	3	1.5	SANDRA
AR	003C003	OLDS to Public	1.1	3	3.4	GERMANTOWN
AR	003C004	OLDS to Public	1.5	3	4.5	GERMANTOWN
AR	003A011	OLDS to Public	1.4	3	4.1	SANDRA
AR	003B004	OLDS to Public	2.0	3	6	SANDRA
AR	003B006	OLDS to Public	0.9	3	2.8	SANDRA
				SUB TOTAL	542.7	
ARC	003G069	OLDS to Public	0.5	2.5	1.2	GERMANTOWN
ARC	003C018	OLDS to Public	0.5	2.5	1.3	GERMANTOWN
				SUB TOTAL	2.5	
BP	003A002	Connect -10 year	2.6	11	28.5	SANDRA
BP	002A015	OLDS to Public	2.9	11	31.5	GERMANTOWN
				SUB TOTAL	60	
C	4087	Connect -10 year	3.1	7	21.9	SANDRA
C	002A006	Connect Ultimate	0.6	7	3.9	BURNSIDE
C	002A014	Connect Ultimate	0.7	7	5	BURNSIDE
C	4039	Connect Ultimate	0.254	7	1.8	SANDRA
C	4041	Connect Ultimate	1.48	7	10.4	SANDRA
C	4036	Connect Ultimate	1.333	7	9.3	SANDRA
C	4042	Connect Ultimate	1.045	7	7.3	SANDRA
C	4088	Connect Ultimate	1.043	7	7.3	SANDRA
C	4035	Connect Ultimate	1.511	7	10.6	SANDRA
C	4089	Connect Ultimate	0.519	7	3.6	SANDRA
C	4040	Connect Ultimate	0.453	7	3.2	SANDRA
C	002A005	OLDS to Public	0.8	7	5.7	BURNSIDE

TABLE 4-2

Potential Growth of Land Connected to Public Sewer

11/7/05

Zoning	Block/Unit	Public Sanitary	Acres	EDU/Acre	Potential EDU	Drainage Area
C	002A013	OLDS to Public	1.6	7	10.9	BURNSIDE
C	4037	OLDS to Public	1.7	7	11.5	BURNSIDE
C	4038	OLDS to Public	0.5	7	3.3	BURNSIDE
C	4040	OLDS to Public	0.5	7	3.2	BURNSIDE
C	002A008	OLDS to Public	2.1	7	14.7	BURNSIDE
C	002A009	OLDS to Public	1.0	7	6.8	BURNSIDE
C	002A010	OLDS to Public	1.2	7	8.2	BURNSIDE
C	002A011	OLDS to Public	0.6	7	4.1	BURNSIDE
C	002A007	OLDS to Public	1.6	7	10.9	BURNSIDE
				SUB TOTAL	163.6	
I	002A023	Connect Ultimate	1.5	2.5	3.7	BURNSIDE
I	002A022	Connect Ultimate	1.4	2.5	3.6	BURNSIDE
I	002A034	Connect Ultimate	2.0	2.5	5	BURNSIDE
I	002A033	OLDS to Public	1.0	2.5	2.6	BURNSIDE
I	002A017	OLDS to Public	3.0	2.5	7.4	BURNSIDE
I	002A020	OLDS to Public	2.6	2.5	6.4	BURNSIDE
I	002A026	OLDS to Public	2.3	2.5	5.7	BURNSIDE
I	002A024	OLDS to Public	2.0	2.5	5.1	BURNSIDE
I	002A028	OLDS to Public	1.9	2.5	4.7	BURNSIDE
I	002A029	OLDS to Public	1.9	2.5	4.8	BURNSIDE
I	002A030	OLDS to Public	2.0	2.5	5	BURNSIDE
I	002A031	OLDS to Public	2.1	2.5	5.4	BURNSIDE
				SUB TOTAL	59.4	
IN	003C015	Connect -10 year	1.9	5	9.4	GERMANTOWN
IN	002A003	Connect Ultimate	1.9	5	9.5	GERMANTOWN
IN	002A004	Connect Ultimate	1.0	5	5.1	GERMANTOWN
IN	1062	OLDS to Public	2.7	5	13.3	GERMANTOWN
IN	003B003	OLDS to Public	0.4	5	2	SANDRA
				SUB TOTAL	39.3	
LI	2057	Connect -10 year	2.2	1.5	3.3	BURNSIDE
LI	2056	Connect -10 year	2.8	1.5	4.2	BURNSIDE
				SUB TOTAL	7.5	
RO	003A006	Connect -10 year	2.0	2	4.1	SANDRA
RO	003A005	Connect -10 year	1.0	2	2.1	SANDRA
				SUB TOTAL	6.2	
RP	003E011	Connect -10 year	1.9	3.5	6.5	GERMANTOWN
RP	003E010	Connect -10 year	1.6	3.5	5.8	GERMANTOWN
RP	003E001	Connect -10 year	0.6	3.5	2.1	SANDRA
				SUB TOTAL	14.4	
				TOTAL GERMANTOWN	895.6	

TABLE 4-2

Potential Growth of Land Connected to Public Sewer

11/7/05

Zoning	Block/Unit	Public Sanitary	Acres	EDU/Acre	Potential EDU	Drainage Area
AR	004D025	Connect -10 year	0.451	3	1.4	WHITEHALL
AR	004D047	Connect -10 year	0.521	3	1.6	WHITEHALL
AR	004D023	Connect -10 year	0.48	3	1.4	WHITEHALL
AR	004D042	Connect -10 year	0.511	3	1.5	WHITEHALL
AR	004D040	Connect -10 year	0.484	3	1.5	WHITEHALL
AR	004D041	Connect -10 year	0.602	3	1.8	WHITEHALL
AR	004D046	Connect -10 year	0.69	3	2.1	WHITEHALL
AR	004D027	Connect -10 year	0.51	3	1.5	WHITEHALL
AR	004D028	Connect -10 year	0.876	3	2.6	WHITEHALL
AR	004D029	Connect -10 year	2.968	3	8.9	WHITEHALL
AR	6058	Connect -10 year	2.228	3	6.7	TIMBERLAKE
AR	6004	Connect Ultimate	2.293	3	6.9	TIMBERLAKE
AR	6082	Connect Ultimate	0.676	3	2.0	TIMBERLAKE
AR	6049	Connect Ultimate	0.387	3	1.2	TIMBERLAKE
AR	6036	Connect Ultimate	1.619	3	4.9	TIMBERLAKE
AR	6035	Connect Ultimate	0.849	3	2.5	TIMBERLAKE
AR	6016	Connect Ultimate	0.835	3	2.5	TIMBERLAKE
AR	6073	Connect Ultimate	0.865	3	2.6	TIMBERLAKE
AR	6071	Connect Ultimate	1.301	3	3.9	TIMBERLAKE
AR	6017	Connect Ultimate	1.897	3	5.7	TIMBERLAKE
AR	6018	Connect Ultimate	0.504	3	1.5	TIMBERLAKE
AR	006G000	Connect Ultimate	0.442	3	1.3	TIMBERLAKE
AR	6015	Connect Ultimate	0.621	3	1.9	TIMBERLAKE
AR	6020	Connect Ultimate	0.771	3	2.3	TIMBERLAKE
AR	6019	Connect Ultimate	0.585	3	1.8	TIMBERLAKE
AR	6029	Connect Ultimate	0.966	3	2.9	TIMBERLAKE
AR	6046	Connect Ultimate	0.834	3	2.5	TIMBERLAKE
AR	004D045	OLDS to Public	0.663	3	2.0	WHITEHALL
AR	004D026	OLDS to Public	0.479	3	1.4	WHITEHALL
AR	004D037	OLDS to Public	1.034	3	3.1	TIMBERLAKE
				SUBTOTAL	83.9	
ARC	004G039	Connect -10 year	0.548	2.5	1.4	TIMBERLAKE
ARC	004D021	Connect -10 year	2.139	2.5	5.3	WHITEHALL
ARC	004D066	Connect -10 year	0.865	2.5	2.2	WHITEHALL
ARC	004D020	Connect -10 year	1.845	2.5	4.6	WHITEHALL
ARC	004D008	Connect -10 year	1.071	2.5	2.7	WHITEHALL
ARC	004D038	Connect -10 year	0.435	2.5	1.1	WHITEHALL
ARC	004G021	OLDS to Public	0.52	2.5	1.3	TIMBERLAKE
				SUBTOTAL	18.6	
BP	6008	Connect -10 year	0.682	11	7.5	TIMBERLAKE
BP	006D009	Connect -10 year	0.248	11	2.7	TIMBERLAKE
BP	006D008	Connect -10 year	0.255	11	2.8	TIMBERLAKE
BP	5012	Connect Ultimate	0.41	11	4.5	TIMBERLAKE
				SUBTOTAL	17.5	
BR	6061	OLDS to Public	0.515	2.5	1.3	TIMBERLAKE
I	6068	Connect Ultimate	1.955	2.5	4.9	TIMBERLAKE
I	004D003	OLDS to Public	2.505	2.5	6.3	WHITEHALL
				SUBTOTAL	11.2	
				TOTAL TIMBERLAKE	132.5	

TABLE 4-2

Potential Growth of Land Connected to Public Sewer

11/7/05

Zoning	Block/Unit	Public Sanitary	Acres	EDU/Acre	Potential EDU	Drainage Area
AR	4000	Connect -10 year	0.087	3	1	NORRIS
AR	005A016	Connect -10 year	0.406	3	1.2	NORRIS
AR	26029	Connect -10 year	0.192	3	1	NORRIS
AR	26000	Connect -10 year	0.065	3	1	NORRIS
AR	005A000	Connect -10 year	0.504	3	1.5	NORRIS
AR	10039	Connect -10 year	0.399	3	1.2	NORRIS
AR	10011	Connect -10 year	0.193	3	1	NORRIS
AR	10036	Connect -10 year	0.217	3	1	NORRIS
AR	10000	Connect -10 year	0.21	3	1	NORRIS
AR	11021	Connect Ultimate	0.153	3	1	NORRIS
AR	13033	Connect Ultimate	0.206	3	1	NORRIS
AR	12022	Connect Ultimate	0.296	3	1	NORRIS
AR	12024	Connect Ultimate	0.075	3	1	NORRIS
AR	13032	Connect Ultimate	0.195	3	1	NORRIS
AR	25010	Connect Ultimate	0.277	3	1	NORRIS
AR	26064	Connect Ultimate	0.198	3	1	NORRIS
AR	25012	Connect Ultimate	0.374	3	1.1	NORRIS
AR	13037	Connect Ultimate	0.283	3	1	NORRIS
AR	26148	Connect Ultimate	1.121	3	3.4	NORRIS
AR	25013	Connect Ultimate	0.252	3	1	NORRIS
AR	13030	Connect Ultimate	0.613	3	1.8	NORRIS
AR	13002	Connect Ultimate	0.935	3	2.8	NORRIS
AR	25015	Connect Ultimate	0.24	3	1	NORRIS
AR	13020	Connect Ultimate	0.456	3	1.4	NORRIS
AR	26026	Connect Ultimate	0.331	3	1	NORRIS
AR	25023	Connect Ultimate	0.21	3	1	NORRIS
AR	26065	Connect Ultimate	0.176	3	1	NORRIS
AR	9049	Connect Ultimate	0.221	3	1	NORRIS
AR	005B035	Connect Ultimate	0.281	3	1	NORRIS
AR	9036	Connect Ultimate	0.166	3	1	NORRIS
AR	26043	Connect Ultimate	0.395	3	1.2	NORRIS
AR	9035	Connect Ultimate	0.242	3	1	NORRIS
AR	9039	Connect Ultimate	0.269	3	1	NORRIS
AR	9010	Connect Ultimate	0.291	3	1	NORRIS
AR	9060	Connect Ultimate	0.118	3	1	NORRIS
AR	10035	Connect Ultimate	0.279	3	1	NORRIS
AR	9004	Connect Ultimate	0.286	3	1	NORRIS
AR	10028	Connect Ultimate	0.429	3	1.3	NORRIS
AR	10026	Connect Ultimate	0.22	3	1	NORRIS
AR	12020	OLDS to Public	0.217	3	1	NORRIS
AR	003G069	OLDS to Public	0.4	3	1.2	NORRIS
AR	25011	OLDS to Public	0.29	3	1	NORRIS
AR	25014	OLDS to Public	0.25	3	1	NORRIS
AR	26019	OLDS to Public	0.16	3	1	NORRIS
AR	26023	OLDS to Public	0.991	3	3	NORRIS
AR	25022	OLDS to Public	0.233	3	1	NORRIS
AR	26025	OLDS to Public	0.588	3	1.8	NORRIS
AR	26024	OLDS to Public	0.165	3	1	NORRIS
AR	26035	OLDS to Public	0.556	3	1.7	NORRIS
AR	26027	OLDS to Public	0.346	3	1	NORRIS
AR	005B027	OLDS to Public	0.866	3	2.6	NORRIS
AR	005D041	OLDS to Public	0.69	3	2.1	NORRIS
AR	26142	OLDS to Public	0.383	3	1.1	NORRIS
AR	26010	OLDS to Public	0.358	3	1.1	NORRIS
AR	10034	OLDS to Public	0.275	3	1	NORRIS
AR	10027	OLDS to Public	0.264	3	1	NORRIS
AR	10012	OLDS to Public	0.153	3	1	NORRIS
				SUBTOTAL	70.5	

TABLE 4-2

Potential Growth of Land Connected to Public Sewer

11/7/05

Zoning	Block/Unit	Public Sanitary	Acres	EDU/Acre	Potential EDU	Drainage Area
BP	006D007	Connect -10 year	0.238	11	2.6	NORRIS
BP	005B038	Connect Ultimate	2.218	11	24.4	NORRIS
					27	
BR	005A026	Connect -10 year	0.13	2.5	1	NORRIS
BR	9000	Connect -10 year	0.646	2.5	1.6	NORRIS
BR	10020	Connect -10 year	0.337	2.5	1	NORRIS
BR	19067	Connect -10 year	0.296	2.5	1	NORRIS
BR	027G025	Connect -10 year	0.437	2.5	1.1	NORRIS
BR	19063	Connect -10 year	0.17	2.5	1	NORRIS
BR	20056	Connect -10 year	0.332	2.5	1	NORRIS
BR	22020	Connect -10 year	0.046	2.5	1	NORRIS
BR	23062	Connect -10 year	0.182	2.5	1	NORRIS
BR	23067	Connect -10 year	0.188	2.5	1	NORRIS
BR	23069	Connect -10 year	0.364	2.5	1	NORRIS
BR	23074	Connect -10 year	0.177	2.5	1	NORRIS
BR	20032	Connect -10 year	0.128	2.5	1	NORRIS
BR	23033	Connect -10 year	0.139	2.5	1	NORRIS
BR	23034	Connect -10 year	0.135	2.5	1	NORRIS
BR	21034	Connect -10 year	0.187	2.5	1	NORRIS
BR	22023	Connect -10 year	0.038	2.5	1	NORRIS
BR	21038	Connect -10 year	0.063	2.5	1	NORRIS
BR	23027	Connect -10 year	0.283	2.5	1	NORRIS
BR	23002	Connect -10 year	0.139	2.5	1	NORRIS
BR	21024	Connect -10 year	0.077	2.5	1	NORRIS
BR	21023	Connect -10 year	0.126	2.5	1	NORRIS
BR	23003	Connect -10 year	0.139	2.5	1	NORRIS
BR	21041	Connect -10 year	0.034	2.5	1	NORRIS
BR	21051	Connect -10 year	0.255	2.5	1	NORRIS
BR	21030	Connect -10 year	0.093	2.5	1	NORRIS
BR	23007	Connect -10 year	0.07	2.5	1	NORRIS
BR	23084	Connect -10 year	0.069	2.5	1	NORRIS
BR	21021	Connect -10 year	0.141	2.5	1	NORRIS
BR	21012	Connect -10 year	0.135	2.5	1	NORRIS
BR	24010	Connect -10 year	0.193	2.5	1	NORRIS
BR	21032	Connect -10 year	0.139	2.5	1	NORRIS
BR	005A025	Connect Ultimate	0.152	2.5	1	NORRIS
BR	9026	Connect Ultimate	0.361	2.5	1	NORRIS
BR	9056	Connect Ultimate	0.456	2.5	1.1	NORRIS
BR	23032	OLDS to Public	0.14	2.5	1	NORRIS
BR	19004	OLDS to Public	0.284	2.5	1	NORRIS
BR	21020	OLDS to Public	0.127	2.5	1	NORRIS
				SUBTOTAL	38.8	
C	26003	Connect -10 year	1.712	7	12	NORRIS
C	20060	Connect -10 year	0.144	7	1	NORRIS
C	14000	Connect Ultimate	0.319	7	2.2	NORRIS
C	14015	Connect Ultimate	0.572	7	4	NORRIS
C	26028	Connect Ultimate	0.221	7	1.5	NORRIS
C	26003	Connect Ultimate	1.7	7	12	NORRIS
				SUBTOTAL	32.7	
C1	20061	Connect -10 year	0.33	8	2.6	NORRIS
C1	21050	Connect -10 year	0.137	8	1.1	NORRIS
C1	21045	Connect -10 year	0.164	8	1.3	NORRIS
				SUBTOTAL	5	

TABLE 4-2

Potential Growth of Land Connected to Public Sewer

11/7/05

Zoning	Block/Unit	Public Sanitary	Acres	EDU/Acre	Potential EDU	Drainage Area
RP	027C017	Connect Ultimate	0.589	3.5	2.1	NORRIS
RP	027C016	Connect Ultimate	1.26	3.5	4.4	NORRIS
				SUBTOTAL	6.5	
				TOTAL NORRIS	180.5	

TABLE 4-2

Potential Growth of Land Connected to Public Sewer

11/7/05

Zoning	Block/Unit	Public Sanitary	Acres	EDU/Acre	Potential EDU	Drainage Area
AR	027C014	Connect -10 year	0.477	3	1.4	SAWMILL
AR	027C013	Connect -10 year	0.333	3	1.0	SAWMILL
AR	027C011	Connect -10 year	1.419	3	4.3	SAWMILL
AR	027C012	Connect -10 year	0.342	3	1.0	SAWMILL
AR	027C000	Connect -10 year	0.469	3	1.4	SAWMILL
AR	027C010	Connect -10 year	0.467	3	1.4	SAWMILL
AR	027C009	Connect -10 year	0.469	3	1.4	SAWMILL
AR	027B017	Connect -10 year	0.621	3	1.9	SAWMILL
AR	027B025	Connect -10 year	0.328	3	1.0	SAWMILL
AR	027B020	Connect -10 year	0.269	3	1.0	SAWMILL
AR	027B022	Connect -10 year	0.999	3	3.0	SAWMILL
AR	027B021	Connect -10 year	0.678	3	2.0	SAWMILL
AR	027B023	Connect -10 year	1.066	3	3.2	SAWMILL
AR	02C011	OLDS to Public	1.4	3	4.3	SAWMILL
AR	027C027	OLDS to Public	0.47	3	1.4	SAWMILL
AR	027B019	OLDS to Public	0.611	3	1.8	SAWMILL
				SUBTOTAL	31.5	
BR	23020	Connect -10 year	0.285	2.5	1.0	SAWMILL
BR	24016	Connect -10 year	0.202	2.5	1.0	SAWMILL
BR	24017	Connect -10 year	0.206	2.5	1.0	SAWMILL
BR	24020	Connect -10 year	0.41	2.5	1.0	SAWMILL
BR	30016	Connect -10 year	0.091	2.5	1.0	SAWMILL
BR	30078	Connect -10 year	0.091	2.5	1.0	SAWMILL
BR	31074	Connect -10 year	0.09	2.5	1.0	SAWMILL
BR	31075	Connect -10 year	0.093	2.5	1.0	SAWMILL
BR	31076	Connect -10 year	0.09	2.5	1.0	SAWMILL
BR	30101	Connect -10 year	0.091	2.5	1.0	SAWMILL
BR	30085	Connect -10 year	0.047	2.5	1.0	SAWMILL
BR	30103	Connect -10 year	0.048	2.5	1.0	SAWMILL
BR	29100	Connect Ultimate	0.048	2.5	1.0	SAWMILL
BR	29105	Connect Ultimate	0.085	2.5	1.0	SAWMILL
BR	29032	Connect Ultimate	0.137	2.5	1.0	SAWMILL
BR	29040	Connect Ultimate	0.067	2.5	1.0	SAWMILL
BR	29041	Connect Ultimate	0.056	2.5	1.0	SAWMILL
BR	29033	Connect Ultimate	0.055	2.5	1.0	SAWMILL
BR	29104	Connect Ultimate	0.054	2.5	1.0	SAWMILL
BR	29037	Connect Ultimate	0.049	2.5	1.0	SAWMILL
BR	30075	Connect Ultimate	0.091	2.5	1.0	SAWMILL
BR	29016	Connect Ultimate	0.096	2.5	1.0	SAWMILL
BR	29014	Connect Ultimate	0.048	2.5	1.0	SAWMILL
BR	29071	Connect Ultimate	0.075	2.5	1.0	SAWMILL
BR	30009	Connect Ultimate	0.089	2.5	1.0	SAWMILL
BR	29133	Connect Ultimate	0.065	2.5	1.0	SAWMILL
BR	29123	Connect Ultimate	0.05	2.5	1.0	SAWMILL
BR	30122	Connect Ultimate	0.095	2.5	1.0	SAWMILL
BR	30006	Connect Ultimate	0.092	2.5	1.0	SAWMILL
BR	30005	Connect Ultimate	0.091	2.5	1.0	SAWMILL
BR	29120	Connect Ultimate	0.046	2.5	1.0	SAWMILL
BR	30003	Connect Ultimate	0.136	2.5	1.0	SAWMILL
BR	30121	Connect Ultimate	0.093	2.5	1.0	SAWMILL
BR	29080	Connect Ultimate	0.048	2.5	1.0	SAWMILL
BR	29079	Connect Ultimate	0.046	2.5	1.0	SAWMILL
BR	30127	Connect Ultimate	0.092	2.5	1.0	SAWMILL
BR	29130	Connect Ultimate	0.046	2.5	1.0	SAWMILL
BR	30063	Connect Ultimate	0.092	2.5	1.0	SAWMILL
BR	29129	Connect Ultimate	0.047	2.5	1.0	SAWMILL
BR	30062	Connect Ultimate	0.094	2.5	1.0	SAWMILL
BR	30119	Connect Ultimate	0.091	2.5	1.0	SAWMILL

TABLE 4-2

Potential Growth of Land Connected to Public Sewer

11/7/05

Zoning	Block/Unit	Public Sanitary	Acres	EDU/Acre	Potential EDU	Drainage Area
BR	31084	Connect Ultimate	0.091	2.5	1.0	SAWMILL
BR	31072	Connect Ultimate	0.095	2.5	1.0	SAWMILL
BR	31083	Connect Ultimate	0.092	2.5	1.0	SAWMILL
BR	30117	Connect Ultimate	0.091	2.5	1.0	SAWMILL
BR	31004	Connect Ultimate	0.154	2.5	1.0	SAWMILL
BR	31071	Connect Ultimate	0.09	2.5	1.0	SAWMILL
BR	31002	Connect Ultimate	0.089	2.5	1.0	SAWMILL
BR	30114	Connect Ultimate	0.093	2.5	1.0	SAWMILL
BR	31003	Connect Ultimate	0.047	2.5	1.0	SAWMILL
BR	30083	Connect Ultimate	0.09	2.5	1.0	SAWMILL
BR	29048	Connect Ultimate	0.047	2.5	1.0	SAWMILL
BR	31080	Connect Ultimate	0.093	2.5	1.0	SAWMILL
BR	30051	Connect Ultimate	0.048	2.5	1.0	SAWMILL
BR	31065	Connect Ultimate	0.092	2.5	1.0	SAWMILL
BR	29117	Connect Ultimate	0.048	2.5	1.0	SAWMILL
BR	29062	Connect Ultimate	0.048	2.5	1.0	SAWMILL
BR	31009	Connect Ultimate	0.09	2.5	1.0	SAWMILL
BR	31012	Connect Ultimate	0.11	2.5	1.0	SAWMILL
BR	30104	Connect Ultimate	0.043	2.5	1.0	SAWMILL
BR	30105	Connect Ultimate	0.047	2.5	1.0	SAWMILL
BR	30059	Connect Ultimate	0.052	2.5	1.0	SAWMILL
BR	30155	Connect Ultimate	0.049	2.5	1.0	SAWMILL
BR	31028	Connect Ultimate	0.093	2.5	1.0	SAWMILL
BR	30157	Connect Ultimate	0.049	2.5	1.0	SAWMILL
BR	31026	Connect Ultimate	0.137	2.5	1.0	SAWMILL
BR	31107	Connect Ultimate	0.093	2.5	1.0	SAWMILL
BR	30160	Connect Ultimate	0.048	2.5	1.0	SAWMILL
BR	31108	Connect Ultimate	0.047	2.5	1.0	SAWMILL
BR	30167	Connect Ultimate	0.047	2.5	1.0	SAWMILL
BR	31135	Connect Ultimate	0.071	2.5	1.0	SAWMILL
BR	30164	Connect Ultimate	0.047	2.5	1.0	SAWMILL
BR	30165	Connect Ultimate	0.056	2.5	1.0	SAWMILL
BR	31033	Connect Ultimate	0.091	2.5	1.0	SAWMILL
BR	31049	Connect Ultimate	0.047	2.5	1.0	SAWMILL
BR	31034	Connect Ultimate	0.093	2.5	1.0	SAWMILL
BR	31046	Connect Ultimate	0.047	2.5	1.0	SAWMILL
BR	31130	OLDS to Public	0.09	2.5	1.0	SAWMILL
BR	31110	OLDS to Public	0.09	2.5	1.0	SAWMILL
BR	30010	OLDS to Public	0.092	2.5	1.0	SAWMILL
BR	31106	OLDS to Public	0.091	2.5	1.0	SAWMILL
				SUBTOTAL	81.0	
C	027F009	Connect Ultimate	1.996	7	14.0	SAWMILL
C	027H044	Connect Ultimate	0.081	7	1.0	SAWMILL
					15.0	
IN	24024	Connect -10 year	0.832	5	4.2	SAWMILL
IN	24021	Connect -10 year	0.274	5	1.4	SAWMILL
				SUBTOTAL	5.6	
MR	027J046	Connect Ultimate	0.292	5.5	1.6	SAWMILL
RO	28011	Connect -10 year	0.371	2	1.0	SAWMILL
RO	23045	Connect -10 year	0.379	2	1.0	SAWMILL
RO	28014	Connect -10 year	0.143	2	1.0	SAWMILL
RO	28003	OLDS to Public	0.73	2	1.5	SAWMILL
RO	28010	OLDS to Public	0.369	2	1.0	SAWMILL
RO	23044	OLDS to Public	0.36	2	1.0	SAWMILL
				SUBTOTAL	6.5	

TABLE 4-2

Potential Growth of Land Connected to Public Sewer

11/7/05

Zoning	Block/Unit	Public Sanitary	Acres	EDU/Acre	Potential EDU	Drainage Area
				TOTAL SAWMILL	141.2	

TABLE 4-3

East Norriton Township Connection Management

Last Revised: 06/25/05

PMA - Planning Module Approved
PHR - Pump & Haul Request
E - Exception Requested -Replacement Flow

Development	DEP CODE	EDUs Required	Planning Module Approved - Exception # EDU's	Subdivision or Land Development Plan Approved	EDU's Paid	Permits Issued or Existing EDU's or Replacement Flows	EDUs Needed	Pump Station Drainage Area	Priority
Reserve @ Penn Crossing - Cutler - 78 EDU's Approved 2003 Paid in Full	ENPWJSA	78	78 PMA	Y	78	9 Permits	39	Saw Mill	1
Mercy Suburban Hospital - **Requesting Exemption - Facility Public Need**	ENPWJSA	16	16 E	Y	N	-	16	Norris City	1
Pimlico Farms - Gambone - **35 EDU's Approved 1998** Paid for 46 - 5/24/05	ENPWJSA	46	35 PMA	Y	Y	-	35	Germantown	1
Jefferson Crossing - Philomeno/Salamone - **Replacing existing 34 EDU's**	1-46926-130-3J	84	34 E	Y	N	34 Replacement	50	Norris City	1
from Jefferson House Rest.									
Heatherwood - Erb/Mascio/Gambone	1-46926-118-3J	28	N	Y	N	-	28	Timberlake	1
Dr Valenza - Germantown Pike/N Wales Road	ENPWJSA	8	N	Y	N	-	8	Timberlake	1
MRA Carwash - Germantown Pike - 2EDU's Present	1-46926-127-3J	8	N	Y	N	2 Replacement	6	Norris City	1
Evergreen Terrace Calamia - Erb/Mascio - 3 EDU's present connection	ENPWJSA	10	N	N	N	3 Replacement	8	Timberlake	1
Eric Winchester - 117 Hancock Ave - Single Home on last remaining vacant lot	1-46926-129-X	1	N	Y	N	-	1	Norris City	1
DeStefano - Bristol Ave - Single Home on vacant lot	ENPWJSA	1	N	Y	N	-	1	Saw Mill	1
Crowley Foods - Gambone	ENPWJSA	5	N	Y	N	-	5	Germantown	1
Pat Bradley - Barbara Drive - Single Home on Vacant Lot	ENPWJSA	1	N	Y	N	-	1	Timberlake	1
Kinder Care - Tornetta **Bentwood - 236 EDU's Approved 1998 - 58 EDU's Paid 1998**	1-46926-J04-E	4	236 PMA	Y	58	5 Permits	4	Saw Mill	1
Norriton Business Campus - 58 EDU's Approved in 1988	ENPWJSA	10	58 PMA	Y	58	28 Permits	10	Germantown	1
Moreland Dev. - Bank - Whitehall/Germantown - Last pad of 3 pad site	ENPWJSA	10	25 PMA	Y	N	2 Permits	10	Germantown	1
Northwood - Tornetta **(request transfer 30 EDU's (5 EDU's existing) of approved 58 EDU's**	ENPWJSA	30	N	N	N	5 Replacement	25	Saw Mill	1
paid for for in 1998. The Bentwood Project received approval for 236 EDU's in 1998)									
Anderson's - Rahway Ave - Single Home on vacant lot	ENPWJSA	1	N	Y	N		1	Saw Mill	
Carol Mobile - Butchers Lane - Single Home on vacant lot - ejector pump	ENPWJSA	1	N	Y	N		1	Norris City	
TOTAL REQUESTED PRIORITY NO. 1		342					249		
Reserve @ Penn Crossing - Cutler - Remaining Connection	ENPWJSA	30	30 PMA	Y	78	-	30	Norris City	2
Pimlico Farms - Gambone - Remaining Connections	ENPWJSA	11	35 PMA	Y	N	-	11	Germantown	2
Norriton Business Campus - **58 EDU's Approved in 1988**	ENPWJSA	20	58 PMA	Y	Y	28 Permits	20	Germantown	2
Gorman Welding	ENPWJSA	5	N	N	N	-	5	Germantown	2
DeKalb Apartments - DeKalb Pike	ENPWJSA	40	N	N	N	-	40	Norris City	2
Waterworks - DeKalb Pike & Johnson Highway	ENPWJSA	40	N	N	N	-	40	Saw Mill	2
Northwood - Tornetta - **Request to transfer from Bentwood Project approved EDU's**	ENPWJSA	120	N	N	N	-	120	Norris City	2
Del Markward - 911 W. Germantown Pike	ENPWJSA	56	N	N	N		56	Germantown	

TABLE 4-3

East Norriton Township Connection Management

Last Revised: 06/25/05

PMA - Planning Module Approved
PHR - Pump & Haul Request
E - Exception Requested -Replacement Flow

Development	DEP CODE	EDUs Required	Planning Module Approved - Exception # EDU's	Subdivision or Land Development Plan Approved	EDU's Paid	Permits Issued or Existing EDU's or Replacement Flows	EDUs Needed	Pump Station Drainage Area	Priority
TOTAL REQUESTED PRIORITY NO. 2		322					322		
Waterworks - DeKalb Pike & Johnson Highway	ENPWJSA	26	N	N	N	-	26	Saw Mill	3
DeKalb Apartments - DeKalb Pike	ENPWJSA	40	N	N	N	-	40	Norris City	3
Miller Electric - End of Felton Rd	ENPWJSA	10	N	N	N	-	10	Timberlake	3
Plantone/Brance - Whitehall Road	ENPWJSA	20	N	N	N	3 Replacement	17	Germantown	3
Del Markward - 911 W. Germantown Pk	ENPWJSA	55	N	N	N	-	55	Germantown	3
Bentwood Flex Development - **Remaining Project EDU's**	ENPWJSA	28	Y	Y	N	-	28	Norris City	3
District Court Office Building	ENPWJSA	15	N	N	N		15	Timberlake	3
Clements Meat Market - Old Arch Road	ENPWJSA	20	N	N	N	3 Replacement	17	Saw Mill	3
FAILED SEPTIC SYSTEMS THROUGHOUT TWP	ENPWJSA	20	NA	NA	NA	-	20		3
NORTHWOODS - 150 CREDITED BACK TO BENTWOOD	ENPWJSA	240	N	N	N		240		3
TOTAL REQUESTED PRIORITY NO. 3		474				-	468		

Priority 1	342	**249**
Priority 2	322	322
Priority 3	474	468
	1138	1,039

Definitions:

Priority 1 - Connections desired ASAP	**249**
Priority 2 - Connections desired between 6 months and 1 year	**322**
Priority 3 - Connections desired beyond first year	**468**

WHITPAIN TOWNSHIP
MONTGOMERY COUNTY, PENNSYLVANIA

ACT 537 PLAN REVISION

PREPARED IN ACCORDANCE WITH
PA ACT 537 AND LATER REVISIONS
AND PADEP CHAPTER 71

FINAL DRAFT JANUARY 2006

S C Engineers, Inc.
P.O. Box 407
Fort Washington, PA 19034
(215) 836-9912

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TABLES

FIGURES

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FIGURES (continued)

Note: Tables and Figures are located at the end of the respective Chapters.

1.0 PLAN SUMMARY

Whitpain Township owns and operates a sanitary sewerage system that collects and then conveys the vast majority of the wastewater generated within the Township to two separate wastewater treatment facilities, operated by:

1. East Norriton-Plymouth-Whitpain Joint Sewer Authority (ENPWJSA), and
2. Ambler Borough.

Whitpain Township also has public sewer systems in small corners of the Township that discharge to the Upper Gwynedd Township Municipal Authority and Whitemarsh Township.

The **ENPWJSA** is considering a potential rerating and/or expansion of their facility and requires updated information from each of its contributing municipalities regarding projected requirements for wastewater treatment at the plant. As a result of the projections developed in this study, it has been determined that the future needs of Whitpain Township will require the following capacities in the ENPWJSA wastewater treatment plant:

Flow Parameter	Required Capacity
Average Annual Flow	2.37 mgd
Max. 3-Month Flow	3.50 mgd

The capacities of the conveyance sewers and pumping stations in the Whitpain Township sewerage system that are tributary to the ENPWJSA plant are adequate to handle future needs. Upgrading of the Township Line pumping station in 1993 and the Mermaid Run pumping station in 1997 provided sufficient capacity to meet the ultimate needs of the Township.

Whitpain's currently reserved capacity in the **Ambler** wastewater treatment plant is adequate for the projected future needs of the Wissahickon basin of the Township. Sewerage facilities in that district of the Township's system are also adequate for future needs.

The planning efforts described in this report were conducted under the guidelines and approval of the Pennsylvania Department of Environmental Protection (PADEP).

2.0 PREVIOUS WASTEWATER PLANNING

Whitpain Township originally adopted the county-wide *Sewage Facilities Plan* prepared by the Montgomery County Planning Commission in March 1973 as its official Act 537 plan for wastewater facilities in the Township. Studies and engineering evaluations have been performed since then to upgrade the two major pumping stations, which provide the primary means of wastewater conveyance in the Township.

Key planning studies prepared for wastewater facilities include the following:

Mermaid Run Pumping Station, prepared by BCM Engineers, May 13, 1981

This letter-report evaluated alternatives for expanding the capacity of the Mermaid Run pumping station to meet the demands of proposed development. The report specified design criteria for upgrading the station from its original capacity of 850 gpm to 1,200 gpm. The station was subsequently upgraded in 1983.

Infiltration /Inflow Study for the Lower Township Sewer System, prepared by BCM Engineers, June 1986

As part of this study, portable meters were placed in 24 key manholes to monitor flow in 26 sewer subareas of the lower section of the Township, which included a total of 206,500 feet of collector sewers. The study recommended the construction of the Arch Road force main to divert flows from the Township Line pumping station out of the Saw Mill Run interceptor sewer in Plymouth Township.

Flow Analysis of Sheffield Drive Meter, prepared by BCM Engineers, July 25, 1988

This letter-report evaluated the impacts of the Mermaid Run pumping station discharges on the downstream Saw Mill Run interceptor sewer in Plymouth Township. The study concluded that flow rates on the order of 3,300 gpm appear to be related to sewer overloading, but only when sustained for two hours or more. The study also determined the future needs of the Mermaid Run pumping station to be 2,800 gpm.

Township Line Pumping Station, prepared by BCM Engineers, July 7, 1989

This letter-report reviewed existing flows, known development and vacant land within the service area to project an ultimate pumping need of 3,750 gpm. The station was subsequently upgraded to this capacity in 1992.

Act 537 Plan Revision, prepared by BCM Engineers, October 1996

This official Act 537 Plan revision developed projections for the full build-out of Whitpain Township and the sewerage facilities capacities required to meet the needs. The plan concluded that increased capacity would be required in the East Norriton-Plymouth-Whitpain Joint Sewer Authority and Ambler treatment plants to meet future needs.

Municipal Wasteload Management Reports are also prepared annually in accordance with PADEP Chapter 94 to document past and projected wastewater flows generated within the Township. This information is included in the reports submitted to PADEP by the governing bodies of the two receiving wastewater treatment plants.

In addition to the preceding studies related to wastewater facilities, the Township has also prepared the following significant planning studies:

Build-Out Population Estimates and Vacant Residential Land Study, prepared by E. Van Rieker, November 1987

As the title implies, this study estimated the ultimate population for the Township based on full build-out of vacant land in accordance with then current zoning provisions.

The Whitpain Township Open Space Plan, prepared by E. Van Rieker, November 1995

Of interest to wastewater facilities planning, this plan inventoried existing open space and vacant land in the Township and evaluated its development potential.

Whitpain Township Comprehensive Plan Update (Draft), prepared by The Waetzman Planning Group, September 2002

This update to the 1984 Comprehensive Plan is intended to function as a guide for growth in the Township and for the development of policies and ordinances. Among the tasks involved in the update was a review of existing open space and vacant land in the Township.

The preceding studies and reports provide a basis of reference for this current planning study.

3.0 PHYSICAL AND DEMOGRAPHIC ANALYSIS

3.1 PLANNING AREA

Whitpain Township is located in Montgomery Township, Pennsylvania, between the Boroughs of Ambler and Norristown, as shown on the Location Map, Figure 3-1. The Township was established in 1701 and includes roughly 12.8 square miles. Three major highways traverse the Township: (a) the northeast extension of the Pennsylvania Turnpike (Route 476), (b) DeKalb Pike (US Route 202), and (c) Skippack Pike (PA Route 73).

The planning area for this Act 537 Plan revision includes the entire Township. As discussed later in this report, the planning area includes both of the two major drainage basins in the Township:

1. **Schuylkill River** basin in the southwestern three-quarters of the township, which is served by the East Norriton-Plymouth-Whitpain Joint Sewer Authority (ENPWJSA) wastewater treatment plant (WWTP), and

2. **Wissahickon Creek** basin in the northeastern quarter of the township, which is served by the Ambler Borough WWTP

The limits of the drainage basins and the related sewerage service areas are shown on Figure 3-2.

3.2 PHYSICAL CHARACTERISTICS

Relevant information pertaining to streams, lakes, drainage basins, topography, flood plains and wetlands has been collected into one resource, using computer mapping. This information is reproduced on Figure 3-2.

3.2.1 Stream Basins

As shown on Figure 3-2, there are two primary drainage basins in Whitpain Township:

Drainage Basin	Significant Tributaries
Schuylkill River	Stony Creek Mermaid Run Saw Mill Run
Wissahickon Creek	Willow Run Prophecy Creek

The Wissahickon Creek also flows ultimately to the Schuylkill River, although not as directly as the other tributary streams do.

3.2.2 Soils

Soils within Whitpain Township are mapped based on information compiled by the Montgomery County Soils Survey. There are three general soil associations within Whitpain Township:

- **Lawrenceville-Chalfont-Doylestown** association soils are deep, moderately well to poorly drained soils formed in windblown silt deposits. The soils are generally located on undulating uplands. The major soils have formed in a thick mantle of silt deposited by wind over shale, sandstone and other kinds of bedrock.

- **Abbotstown-Readington-Croton** association soils are deep, moderately well drained to poorly drained soils underlain by shale and sandstone. The soils are generally located on undulating uplands. The soils are nearly level or gently sloping. The soils formed in material weathered from red, black and brown hard shale.

- **Lansdale-Penn-Readington** association soils are deep and moderately deep, well and moderately well drained soils underlain by shale and sandstone. The soils are generally located on rolling uplands. The soils are gently sloping to moderately steep in most places. The soils formed in material weathered from sandstone and conglomerate.

These soils are generally located within the following drainage basins of Whitpain Township:

Soil Association	Drainage Basin
Lawrenceville-Chalfont-Doylestown	Stony Creek, Mermaid Run, Saw Mill Run, Prophecy Creek, upper Wissahickon Creek
Abbotstown-Readington-Croton	Stony Creek, upper Wissahickon Creek
Lansdale-Penn-Readington	Saw Mill Run, Prophecy Creek

Soils are generally significant based on their suitability for on-lot disposal systems (OLDS). However, as discussed later in Chapter 4, the vast majority of Whitpain Township is served by public sanitary sewers. Less than 5% of the properties in the Township rely on private OLDS.

3.2.3 Geology

Montgomery County is underlain by sedimentary and metamorphic bedrock. The southern third of the County, including Whitpain Township, has rock that is nearly the oldest in the country. The large majority of Whitpain Township is underlain by:

Stockton formation, consisting of arkosic sandstone, conglomerate and shale,

although the northwestern section of the Township, generally west of the railroad tracks, is underlain by:

Lockatong formation, consisting of argillite and shale.

3.2.4 Public Water Supply

Public water is supplied in Whitpain Township primarily by two utilities, the North Wales Water Authority (NWWA) and Pennsylvania American Water Company, although Ambler Borough serves a small portion of the Township. The service areas of the three water suppliers are shown in Figure 3-3 and described as follows:

- **North Wales Water Authority** supplies the portion of the Township generally east of US Route 202, north of Hoover Road and Stenton Avenue, and west of Lewis Lane. The NWWA also supplies the section west of US Route 202 and north of Morris Road. Public water is supplied from surface water treated at the Forest Park filtration plant in Chalfont, PA. The raw surface water is pumped from the Delaware River at Point Pleasant, PA.

- **PA-American Water Company** generally supplies the remaining portion of the Township not served by the NWWA and Ambler Borough. Surface water is withdrawn from the Schuylkill River and treated at the company's filtration plant at Norristown, PA.

- **Ambler Borough** serves a small portion of Whitpain Township, generally east of Lewis Lane and Mount Pleasant Avenue, and north of Skippack Pike (PA Route 73). Ambler relies on groundwater wells for its water supply.

There are also a relatively small number of residents in the more rural areas of the township that rely on private wells for water supply.

3.2.5 Wetlands

Wetlands within Whitpain Township are based on the generalized delineation prepared by the US Department of Agriculture in the national inventory. These delineated wetlands are shown with other physical characteristics in Figure 3-2.

3.3 POPULATION

Historic and projected demographic data for Whitpain Township are shown in Table 3-1 and presented graphically in Figure 3-4. The data indicate that substantial growth has occurred in Whitpain Township during the past three decades. Population increased by 19% between 1990 and 2000, as compared to Montgomery County, as a whole, which grew approximately 11% over the same 10-year period.

Housing units increased by 28% increase in the 10-year period from 1990 to 2000. The slower rate of population increase in this period is due to a reduced household size of 2.80 persons per household, following a national trend to smaller household size.

Projections for population growth within the Township during the next three decades have been made by the Delaware Valley Regional Planning Commission, based on past U.S. Census data and land use planning studies. These data indicate that the rate of growth is expected to slow significantly. Population is projected to increase by roughly 4 percent per decade, as shown in Table 3-1.

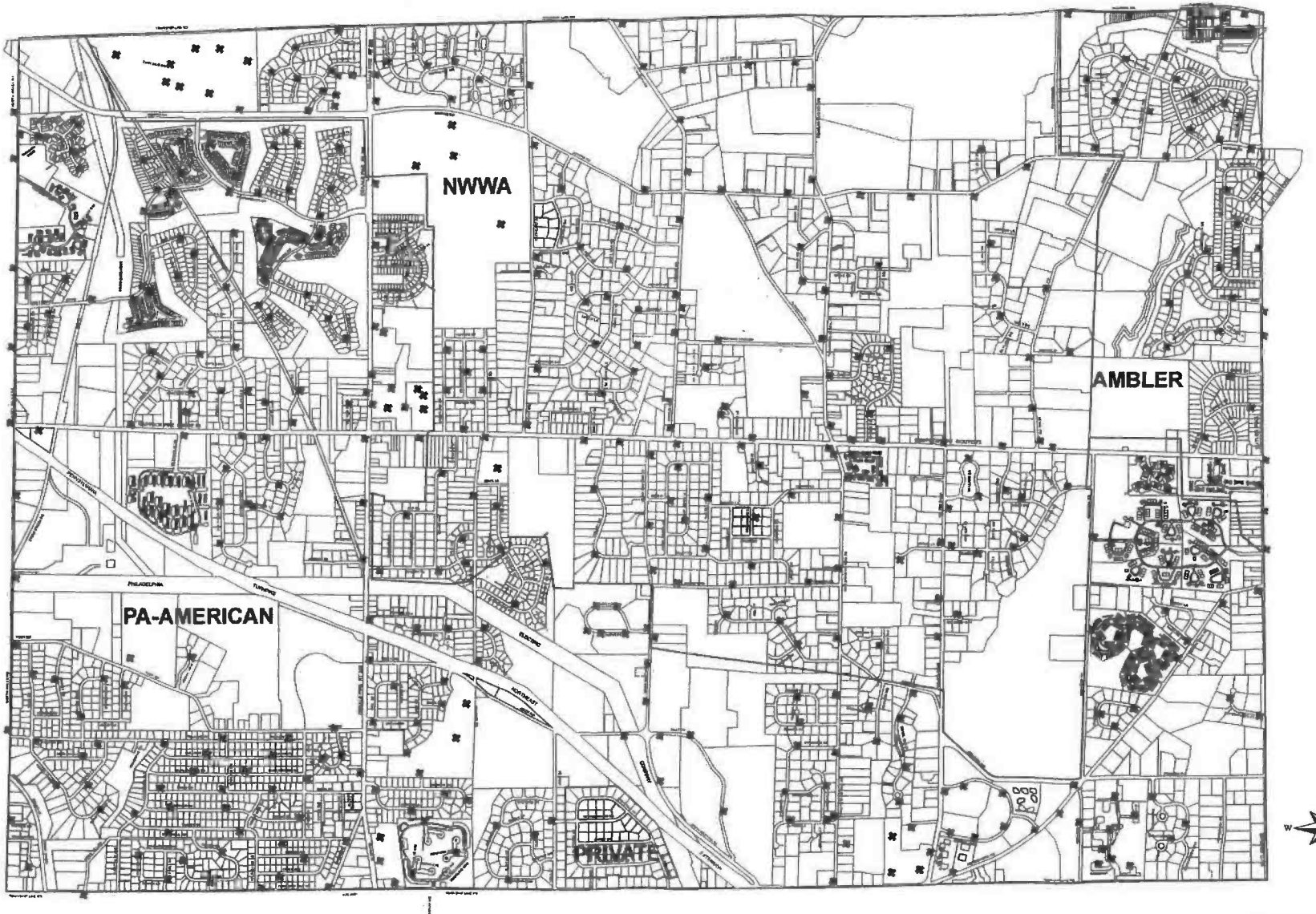
3.4 LAND USE

Existing land use in Whitpain Township is regulated by the current zoning ordinance. Land use was summarized by planning consultants in 1995 and again in 2002, as shown in Table 3-2. A comparison of changes in the Township land use over that time is summarized as follows:

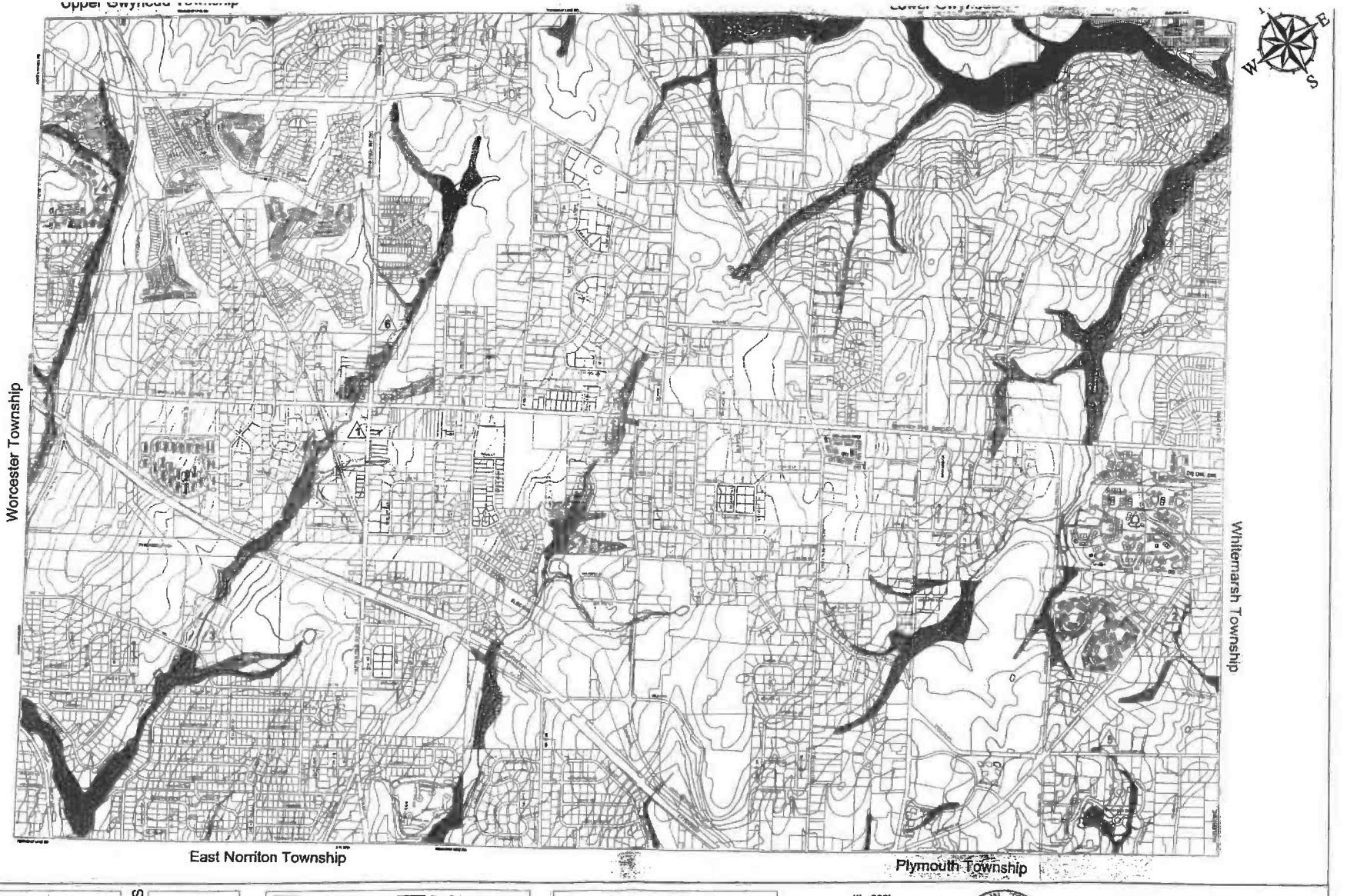
	Land Use			
	1995	2002		Change
Land Use	(acres)	(acres)	(% Total)	(%)
Residential:				
Single Family Detached	3,298		45.4%	
other Residential	617		5.9	
Commercial	642		7.4	
Industrial	195		1.4	
Institutional	616		10.8	
Open Space/Vacant:				
Protected Open Space	361		14.1	
Unprotected Open Space	1,005		12.3	
Vacant	1,458		1.6	
Township Totals	**8,192**		100.0%	

Current zoning in the Township is presented in Figure 3-5. The provisions of the zoning ordinance are summarized in Table 3-3.

WHITPAIN TOWNSHIP WATER SERVICE AREA MAP



December 6, 2005



Revisions

- 6/1995 Map updated and placed in CAD
- 3/1997 Map updated as per LOMR, Nov. 2000 FIRM 4700H0288
- 7/1997 Map updated as per LOMR & ZHB, Dec. 1997 - '97
- 7/1998 Map updated as per LOMR July 25, 2000, FIRM 4700130288
- 10/1998 Chart processor map update
- 12/1998 Map change; plans finalized on duration RD must Commissioner's WP
- Date to be determined

FIRM PANELS

0262 0269
0264 0357
0266 0258
0267 0286
0268 0288

LEGEND

- 100 YR Flood Plain as per FEMA FIRM Maps
- Flood Plain as per Individual Flood Studies
- Alluvial Floodplain Study
- Flood Plain as per Soils Type. US Department of Agriculture Soil Conservation District, Montgomery County Soil Survey, Dated April, 1967. Bm, Ba Bp Ch, Rt, and Ru Soils

NOTE

The Data represented on this plan represents graphically the location of flood plains within Whitpain Township. To accurately locate the flood plain on individual tracts of land will require a detailed hydrologic and hydraulic study to be prepared by the property owner. The study must be approved by the Federal Emergency Management Agency (FEMA) and Whitpain Township as those areas shown as the Flood Insurance Study (FEMA) maps. The flood plain elevations shown as the Flood Insurance Study (FEMA) map for Wissahickon Creek were corrected accurate by the Township and shall be used in flood plain location. All other areas must be studied by the property owner and these studies are subject to approval by Whitpain Township.

1" - 800'

0 400 800 1,600 Feet

Prepared By:

ARRO

649 North Lewis Road
Limerick, PA 19468
(610) 495-2100

WHITPAIN TOWNSHIP
PHYSICAL CHARACTERISTICS

960 Wentz Road
Blue Bell, PA 19422

Rev November 30, 2005

TABLE 3-1
PAST AND PROJECTED POPULATION DATA

Year	Population (persons)	Decade Change (persons)	Decade Change (%)	Housing Units	Household Size (persons/HU)
U.S. Census Bureau					
1970	9,295			2,371	3.92
		2,477	26.6%		
1980	11,772			4,045	2.91
		3,901	33.1%		
1990	15,673			5,703	2.75
1992 est.	16,516			5,890	
1994 est.				6,201	
		2,889	18.4%		
2000	18,562			7,305	2.54
Delaware Valley Regional Planning Commission (1)					
		858	4.6%		
2010	19,420				
		770	4.0%		
2020	20,190				
		810	4.0%		
2030	21,000				

(1) DVRPC, projections bulletin, March 2005

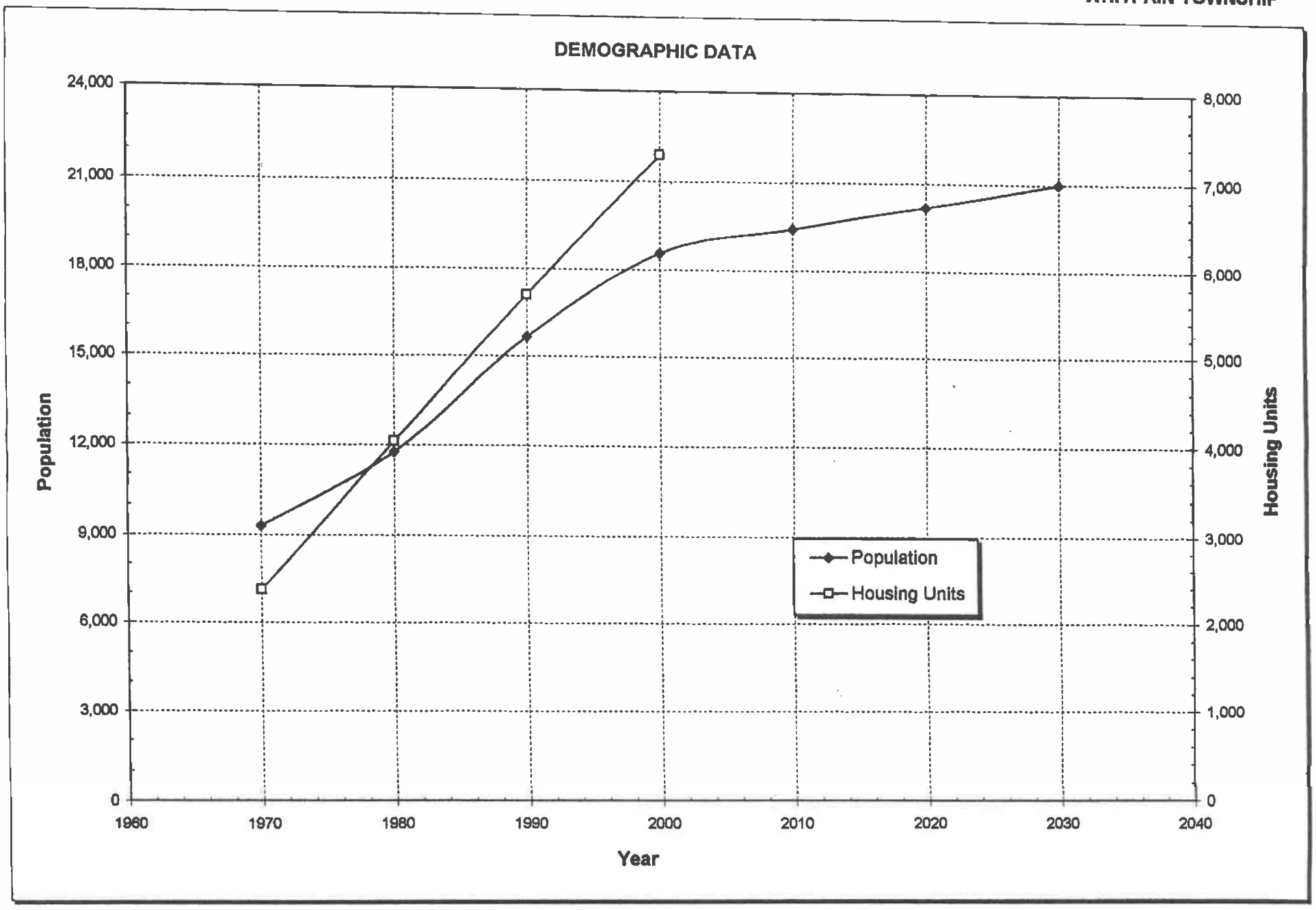


FIGURE 3-4: DEMOGRAPHIC DATA

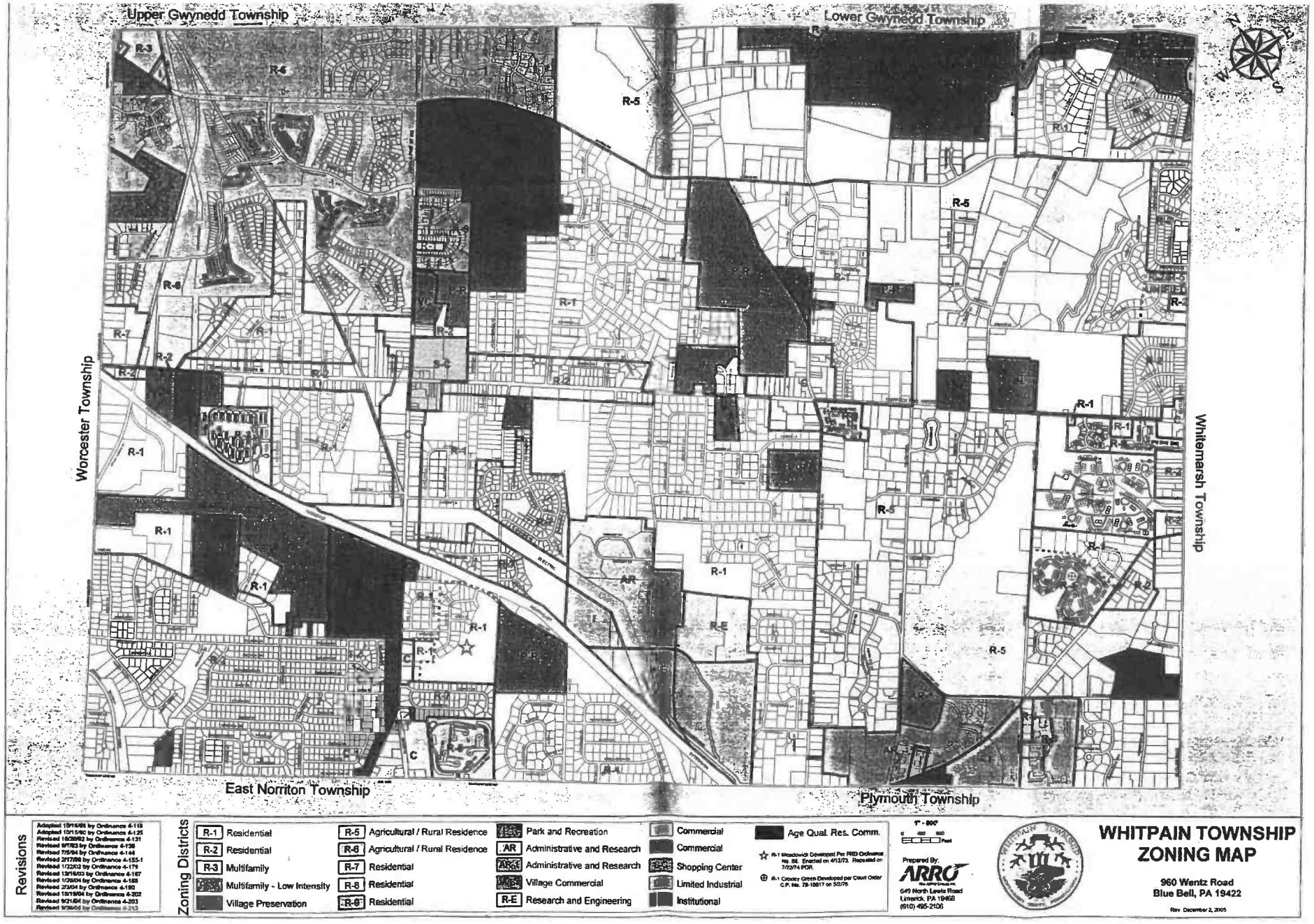
TABLE 3-2
EXISTING LAND USE

Land Use Category	Land Use 1995 (acres)	1995 (%Total)	2002 (acres)	2002 (%Total)	Change: 1995-2002 (acres)	Change: 1995-2002 (%)
Residential						
Single Familly Detached	3,298	40.3%	3,452	45.4%	154	4.7%
Single Familly Attached	366	4.5%				
Multi-Family Apartments	251	3.1%				
Subtotal - Other Residential	617	7.5%	449	5.9%	-168	-27.3%
Total - Residential	**3,915**	**47.8%**	**3,900**	**51.3%**	-15	-0.4%
Commercial						
Retail			160	2.1%		
Office	470	5.7%	380	5.0%	-90	-19.1%
Mixed Commercial	172	2.1%	23	0.3%		
Total - Commercial	**642**	**7.8%**	**563**	**7.4%**	-79	-12.4%
Industrial	195	2.4%	106	1.4%	-89	-45.4%
Institutional						
Institutional	355	4.3%	395	5.2%		
Government	8	0.1%				
Utility	253	3.1%	426	5.6%		
Total - Institutional	**616**	**7.5%**	**821**	**10.8%**	205	33.3%
Open Space/Vacant						
Protected Open Space	361	4.4%	1,072	14.1%	711	197.0%
Wings Field Airport	140	1.7%				
Park and Recreational	865	10.6%				
Unprotected Open Space	1,005	12.3%	935	12.3%		
Vacant	1,458	17.8%	122	1.6%		
Total - Open Space	**2,824**	**34.5%**	**2,129**	**28.0%**	-695	-24.6%
Miscellaneous			76	1.0%		
TOWNSHIP TOTAL	**8,192**	100%	**7,603**	100%		
=	**12.80** sq. miles		**11.88** sq. miles			

Sources:

E. Van Rieker, *Whitpain Township Open Space Plan*, Nov. 1995

Waetzman Planning Group, *Comprehensive Plan Update for Whitpain Township*, Draft, Sept. 2002



Revisions

Adopted 10/14/68 by Ordinance 4-115
Adopted 10/13/80 by Ordinance 4-125
Revised 10/26/82 by Ordinance 4-131
Revised 9/7/83 by Ordinance 4-136
Revised 7/5/84 by Ordinance 4-144
Revised 2/17/86 by Ordinance 4-155-1
Revised 1/22/03 by Ordinance 4-179
Revised 12/16/03 by Ordinance 4-187
Revised 1/26/04 by Ordinance 4-188
Revised 2/3/04 by Ordinance 4-190
Revised 10/19/04 by Ordinance 4-202
Revised 9/21/04 by Ordinance 4-203
Revised 9/26/05 by Ordinance 4-212

Zoning Districts

- R-1 Residential
- R-2 Residential
- R-3 Multifamily
- Multifamily - Low Intensity
- Village Preservation
- R-5 Agricultural / Rural Residence
- R-6 Agricultural / Rural Residence
- R-7 Residential
- R-8 Residential
- R-E Residential
- Park and Recreation
- AR Administrative and Research
- Administrative and Research
- Village Commercial
- R-E Research and Engineering
- Commercial
- Commercial
- Shopping Center
- Limited Industrial
- Institutional
- Age Qual. Res. Comm.

☆ R-1 Meadowlck Developed Per PRD Ordinance No. 56. Enacted on 4/12/73. Recorded on 7/22/74 PDR.

⊕ R-1 Cressey Green Developed per Court Order C.P. No. 78-19817 on 5/2/79.

1" = 800'

0 400 800 Feet

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WHITPAIN TOWNSHIP ZONING MAP

960 Wentz Road
Blue Bell, PA 19422

Rev. December 2, 2005

TABLE 3-3
ZONING PROVISIONS

Zoning District Code	Zoning District Description	Typical Use	Minimum Lot Size (sq. feet)	Maximum Density* (DU/Ac.)	Notes
R-1	Residential	Single family detached	30,000		
R-1	Cluster	Single family detached	22,500	1.1	w/ 25% open space
R-2	Residential	Single family detached			
R-3	Multi-family	Multi-family residences		8 5 4 4	Apartments Townhouses Multiplex Duplex
R-4	Village Preservation	West Ambler	4,000		Single family
R-5	Rural Residence	Low density single family	120,000		
R-5	Cluster	Low density single family	20,000	0.54	based on gross area w/60% open space
R-6	Rural Residence	Low density single family	15,000	0.54	based on gross area w/ 65% open space
R-7	Residential	Single family detached	15,000	2.47	
R-8	Residential	Low density single family attached		2	
R-9	Residential	Mobile home parks		4	
C	Commercial		6,000		

* Density is based on "developable area", unless indicated otherwise

4.0 EXISTING SEWERAGE FACILITIES

4.1 SEWERAGE AGENCIES

Whitpain Township has sole responsibility for providing sewerage service within its municipal borders. However, wastewater treatment is provided primarily by two regional authorities:

Drainage Basin	Wastewater Treatment Authority
Schuylkill	**East Norriton-Plymouth-Whitpain Joint Sewer Authority**
Wissahickon	**Ambler Jointure**

Whitpain Township has three seats and voting rights on the East Norriton-Plymouth-Whitpain Joint Sewer Authority (ENPWJSA), which serves the three townships in the title. Whitpain Township has a seat on the Ambler Jointure. However, the Ambler Jointure serves only as an advisory group to Ambler Borough, which is responsible for the operation of the wastewater treatment plant that serves Ambler Borough and Lower Gwynedd, Montgomery, Upper Dublin, Whitemarsh and Whitpain Townships.

Although the preceding two authorities provide wastewater treatment to the vast majority of Whitpain Township, small sections of the Township receive treatment from the following agencies:

Upper Gwynedd Township Municipal Authority serves the A.C.T.S. retirement community and Wyndemere development in the northwestern corner of the Township on Morris Road, between Route 202 and North Wales Road.

Whitemarsh Township serves the 376 apartment units in the Village of Oxford and roughly 16 residences on Pemberton Road in the southeastern corner of the Township. The service area is generally located along Township Line Road between Narcissa Road and Butler Pike.

This report will concentrate on the service areas of the two primary wastewater treatment agencies: the East Norriton-Plymouth-Whitpain Joint Sewer Authority and the Ambler Jointure. There is no significant potential for growth in the Upper Gwynedd nor Whitemarsh service areas.

4.2 WASTEWATER TREATMENT PLANTS

Whitpain Township does not own or operate a wastewater treatment plant (WWTP). The wastewater generated within the Township flows, either by gravity or by pumping station and force main, to one of two separate wastewater treatment facilities, operated by the East Norriton-Plymouth-Whitpain Joint Sewer Authority (ENPWJSA) or Ambler Jointure. Both of these plants are regional facilities, serving multiple municipalities.

Whitpain's reserved capacity in each plant may be summarized as follows:

Treatment Plant	Capacity (mgd)	
	Total	Whitpain
ENPWJSA	9.3	3.1 (33.3%)
Ambler Jointure	6.5	0.7 (10.8%)

The **ENPWJSA WWTP** is located in Plymouth Township. The plant provides advanced secondary treatment and discharges treated effluent to the Schuylkill River. In accordance with the terms of its NPDES Permit (No. 0026816), the plant is rated to handle an average annual flow of 8.1 mgd and has a hydraulic capacity of 9.3 mgd during maximum monthly conditions. The WWTP also has an organic capacity of 15,540 pounds per day (ppd) of BOD_5. The treatment process employed at the ENPWJSA plant combines an older trickling filtration plant with a newer activated sludge plant. Sludge handling facilities consist of gravity thickening, belt filter press dewatering, with final disposal by incineration. The plant serves all of East Norriton Township, the majority (about 85%) of Plymouth Township, and roughly ¾ of Whitpain Township.

The **Ambler Jointure WWTP** is located on Church Street in Upper Dublin Township. The plant provides tertiary treatment and discharges treated effluent to the Wissahickon Creek. The plant is rated to handle a hydraulic capacity of 6.5 mgd and an organic loading of 10,800 ppd of BOD_5, according to NPDES Permit No. 0026603. The treatment process employed consists of primary and secondary clarification, trickling filtration, attached growth nitrification, microscreening, ultraviolet disinfection and cascade aeration. Sludge handling facilities consist of anaerobic digestion and belt filter press dewatering, with final disposal by landfilling. The plant serves all of Ambler Borough and Lower Gwynedd Township, and portions of Montgomery, Upper Dublin, Whitemarsh and Whitpain Townships.

4.3 COLLECTION/CONVEYANCE SEWER SYSTEM

There are over 112 miles of sewers in the Whitpain Township system. A summary of current sewer lengths is presented in Table 4-1 and contains the following pipe:

Pipe Diameter (inches)	Length (feet)			
	ENPWJSA	Ambler	other	Total
8	373,330	141,610	18,250	533,000
10	5,390	5,880		11,265
12	8,230	1,760		9,990
15	11,890	4,190		16,080
18	12,330	11,860		24,190
24	640			640
Total	411,810	165,300	18,250	**595,360**
(miles)	78.0	31.3	3.5	**112.8**

As shown in the preceding tabulation and in Table 4-1, roughly 70% of the Whitpain sewers discharge to the ENPWJSA system. Another 27% of the Whitpain sewers discharge to the Ambler system, with the remaining 3% discharging to the Whitemarsh or Upper Gwynedd systems. The sewerage system in Whitpain Township is presented in Figure 4-1 and described in the following sections.

4.3.1 ENPWJSA Service Area

The collector sewer system in the ENPWJSA service area of Whitpain Township was originally constructed in 1966. These original six construction contracts included:

a. 98,900 feet of 8-inch **collector sewers in the Stony Creek basin**, including Whitpain Manor, Washington Square Heights, Center Square Green, Dekalb Farms, and Meadowlands Manor
b. 11,700 feet of **interceptor sewer along the Stony Creek**, ranging in diameter from 12 to 24-inch and extending from the pumping station at Township Line Road to Dekalb Pike (Route 202)
c. **Township Line pumping station**
d. 47,400 feet of 8-inch **collector sewers in the Mermaid Run basin**, including Mermaid Estates, Dekalb Park, and Blue Bell Garden
e. 11,200 feet of **interceptor sewer along the Mermaid Run**, ranging in diameter from 10 to 18-inch and extending from the Mermaid Run pumping station at Township Line Road to Skippack Pike (Route 73)
f. **Mermaid Run pumping station**
g. Stenton Avenue ejector station (decommissioned in 1990's)

Sewers have been added throughout the intervening years, generally to accommodate residential development. The Whitpain sanitary sewer system tributary to the ENPWJSA treatment plant is summarized according to the five sewer sub-basins as follows:

	Sewer Basin	Sewer Length (feet), by Pipe Diameter							No. MH
		8	10	12	15	18	24	Total	
A	Stony Creek	221,930	2,810	7,230	3,270	6,310	640	242,190	1,104
B	Mermaid Run	109,940	2,580	1,000	8,620	4,370	0	126,510	514
C	Sheffield Dr. Meter	5,890	0	0	0	1,650	0	7,540	26
D	Walton Rd. Meter	25,590	0	0	0	0	0	25,590	123
E	Narcissa Road PS	6,980	0	0	0	0	0	6,980	30
	Totals	373,330	5,390	8,230	11,890	12,330	640	**411,810**	**1,797**

Flows from the collector sewer system are conveyed by two primary interceptor sewers. The Stony Creek and Mermaid Run interceptor sewers drain to the Township Line and Mermaid Run pumping stations, respectively. Descriptive data for the interceptor sewers are presented in the following tabulation:

Name/Location	Length (feet)	Pipe Diam.	Limiting Capacity (mgd)
Stony Creek Interceptor	11,930	12"-24"	5.0
Mermaid Run Interceptor	12,985	15"-18"	4.0

There are also additional trunk sewers that convey flows from sewer system sub-areas. An 8-inch sewer in Jolly Road carries flows from an industrial/commercial zone, primarily including Unisys Corporation, to the Sheffield Drive meter chamber (sub-area C). A 10-inch sewer in Penllyn Pike conveys flows from sub-area D to the Walton Road meter chamber.

4.3.1.1 Downstream Intermunicipal Conveyance Facilities

Flows from Whitpain are conveyed to the East Norriton-Plymouth-Whitpain Joint Sewer Authority (ENPWJSA) plant by a series of sewerage facilities, including (a) the Saw Mill interceptor sewer, owned by Plymouth Township, (b) the Saw Mill Run pumping station, and (c) the Ross Street interceptor sewer, as shown in Figure 4-2. The latter two facilities are owned and operated by the ENPWJSA.

Saw Mill interceptor sewer conveys wastewater flows from both Whitpain and Plymouth Townships from Township Line Road to the Saw Mill Run pumping station. The Saw Mill interceptor sewer was constructed circa 1960 and the upper portion includes two major branches: (1) a 10-inch branch sewer conveys flows from Whitpain's Walton Road meter chamber and (2) an 18-inch branch sewer conveys flows from Whitpain's Sheffield Drive meter chamber. The interceptor includes over 16,800 feet of 10- through 24-inch sewer, as shown in the subsequent tabulation.

The use of the interceptor is governed by the Plymouth-Whitpain Transportation Agreement dated October 5, 1959. The intermunicipal Agreement has been amended periodically, most significantly on November 24, 1980 (Amendment No. 3). The intermunicipal Agreement delineates the interceptor into five segments, as shown schematically in Figure 4-3, and contains two major provisions: (1) it establishes maximum flow limits for discharge to the interceptor segments and (2) it allocates percentages for sharing the maintenance and repair costs of the Saw Mill interceptor segments. The provisions of the original 1959 Agreement, as amended, are summarized in Table 4-2.

An analysis of connections to each segment of the Saw Mill interceptor performed in 2004 is summarized as follows:

Sewer Segment No.	Name	Pipe Diam. (inches)	Pipe Length (feet)	Whitpain Agreed Share	Sewer Connections Whitpain (EDU)	Whitpain (%)	Plymouth (EDU)	Plymouth (%)
D	Township Line Rd.	8		0%	35	14%	214	86%
A	Walton branch (upper)	10	2,770	46.0%	561	47%	637	53%
C	Walton branch (lower)	10	4,150	46.0%	561	40%	853	60%
E	Sheffield branch	18-21	4,230	74.5%	2,191	84%	418	16%
B	Saw Mill Interceptor	24	5,650	80.1%	2,752	53%	2,448	47%

Saw Mill Run pumping station, owned by the ENPWJSA, is located on Johnson Highway, just west of Arch Road. The station receives the entire wastewater flows from Whitpain and East Norriton Townships and the major portion of flows from Plymouth Township. The station has two distinct sides: (1) the older, eastern section was constructed in 1959 and has three pumps and (2) the western section was constructed in 1978 and also has three pumps. The wetwells for the two sections are interconnected by a sluice gate, allowing the optimum use of all pumps. With five of the six pumps operating, the station is reported to have a capacity of 18.1 mgd. The station discharges flows through two 24-inch force mains from each side of the station. The force mains discharge flow to interceptor sewers primarily in Fairfield Road and Ross Street.

ENPWJSA interceptor sewers convey flows from the Saw Mill Run pumping station to the WWTP. The sewers are shown schematically in Figure 4-4 and include roughly 6,700 feet of sewer ranging in diameter from 18 to 36 inches. The interceptor sewers discharge flows to the WWTP.

4.3.2 Ambler Service Area

The collector sewer system in the Ambler service area of Whitpain Township was originally constructed in 1961 in the West Ambler section of the Township and along Butler Pike between Skippack Pike and the Wissahickon Creek. The original three construction contracts included:

a. 27,650 feet of 8-inch and 5,945 feet of 10-inch **collector sewers** in West Ambler, Mercer Hill Village, Graystone Farms, and Broad Axe Village
b. 1,910 feet of 18-inch **interceptor sewer along the Prophecy Creek**
c. **Skippack Pike pumping station**
d. 2,790 feet of 15-inch and 4,250 feet of 18-inch **interceptor sewer along the Wissahickon Creek**, jointly financed by Whitpain and Lower Gwynedd Townships

Sewers have been added throughout the intervening years, generally to accommodate residential development. One significant improvement was the construction in 1987 of the Prophecy Creek interceptor sewer from Skippack Pike to the existing interceptor near Morris Road. The construction of this interceptor allowed the abandonment of the Skippack Pike pumping station. A summary of current sanitary sewer system tributary to the Ambler treatment plant is summarized according to the three service areas as follows:

	Sewer Basin	Sewer Length (feet), by Pipe Diameter 8	10	12	15	18	Total	No. MH
1	Prophecy Creek	122,170	5,880	1,760	4,190	11,860	145,860	604
2	Willow Run	12,430	0	0	0	0	12,430	44
3	Wissahickon Creek	7,010	0	0	0	0	7,010	31
	Totals	141,610	5,880	1,760	4,190	11,860	**165,300**	**679**

Flows from roughly 90% of the current connections in the Ambler service area of the Whitpain sewer system drain to the 18-inch Prophecy Creek interceptor sewer. The Prophecy Creek interceptor sewer discharges Whitpain flows to the joint Wissahickon Creek interceptor. An 8-inch trunk sewer in Skippack Pike (PA Route 73) conveys flows from the Willow Run basin and the Beale Road pumping station to the Prophecy Creek interceptor sewer. A 10-inch trunk sewer along Butler Pike conveys flows to the Prophecy Creek interceptor, upstream of Morris Road. Descriptive data for these trunk and interceptor sewers in the Ambler service area are presented in the following tabulation:

Interceptor Sewer	Length (feet)	Pipe Diam.	Limiting Section Capacity (mgd)	Slope
Skippack Pike trunk sewer	4,265	8"	1.0	0.016
Butler Pike trunk sewer	3,040	8"-10"	0.9	0.004
Prophecy Creek interceptor	5,925	18"	3.9	0.0012

There is no interceptor sewer along the Willow Run stream. Existing sewers in this drainage sub-basin flow to the Beale Road pumping station, which discharges the wastewater to the Prophecy Creek sewer system.

4.3.2.1 Downstream Intermunicipal Conveyance Facilities

Flows from the Whitpain collector sewer system are conveyed to the Ambler treatment plant by the joint Wissahickon Creek interceptor sewer.

The **joint interceptor sewer** along the Wissahickon Creek serves primarily Whitpain Township and the Lower Gwynedd Township Municipal Authority (LGTMA). The joint interceptor includes approximately 7,475 feet of 15-inch and 18-inch sewer that extends from above Mount Pleasant Avenue to the Ambler wastewater treatment plant (WWTP). The sewer was originally constructed circa 1960 by Whitpain Township. Upstream of Butler Pike, the joint interceptor receives flows from both Whitpain and the LGTMA. Upper Dublin Township discharges to the joint interceptor downstream of Butler Pike.

An intermunicipal agreement dated December 16, 1959, with subsequent amendments, governs the use of the Ambler WWTP and the joint Wissahickon Creek interceptor. According to the

intermunicipal agreement, the joint Wissahickon Creek interceptor is defined to have a capacity of 2.58 mgd, with the following municipal allocations:

Municipality	Capacity (gpd)
Whitpain Township	1,125,000
Lower Gwynedd Township	1,388,000
Upper Dublin Township	67,500
Total	2,580,500

The intermunicipal agreement also assigns maintenance responsibility to Whitpain Township, which can then assign any maintenance/repair costs to the contributing municipalities.

The intermunicipal agreements regarding the Ambler WWTP and the joint interceptor do not require the installation of flow meters. The requirement for metering of the joint interceptor flows was included in a recent agreement regarding the service of Plymouth Road and Lantern Lane in Whitpain Township by the parallel LGTMA interceptor that extends along the Wissahickon Creek from Township Line Road, west of Penllyn Pike, to the Ambler WWTP.

4.4 PUMPING STATIONS

4.4.1 ENPWJSA Service Area

There are three major pumping stations in the ENPWJSA service area:

Pumping Station	Drainage Basin	Capacity (gpm)	No. of Pumps	Year of Construction
North Wales Road	Stony Creek (A)	615	2	1994
Township Line	Stony Creek (A)	3,750	3	1967
Mermaid Run	Mermaid Run (B)	2,800	2	1967

North Wales Road pumping station is located on North Wales Road, north of Skippack Pike (PA Route 73). The station began operation in January 1995 and is a dry well/wet well type. The station serves the western portion of the Blue Bell Country Club (which drains toward Worcester Township) and the Yorkshires development. The station discharges flows through an 8-inch force main in North Wales Road to a sewer south of Yost Road, which ultimately drains to the Township Line pumping station.

Township Line pumping station is located on Township Line Road at Erbs Mill Road, east of North Wales Road. The station is a dry well/wet well type and serves the entire Stony Creek basin. The most recent upgrading of the station was substantially completed in August 1993, when the two pre-existing pumps were replaced with three new pumps. The station discharges flows through an

18-inch force main in Township Line Road and Arch Road to the Saw Mill Run pumping station, which is owned and operated by the ENPWJSA.

Mermaid Run pumping station is located on Township Line Road between Dekalb Pike (US Route 202) and Arch Road. The station is a dry well/wet well type and serves the entire Mermaid Run basin. An upgrading of the Mermaid Run station began in June 1996 and was completed in July 1997. A new 18-inch force main, paralleling the original 12-inch force main, was also completed by the end of 1996. The station discharges flows through the new force main in Township Line Road to an 18-inch gravity sewer at Sherwood Drive, which drains to the Sheffield Drive meter chamber.

The Township Line and Mermaid Run stations pump the large majority of Whitpain flows to the ENPWJSA plant as shown schematically in Figure 4-2. The Township Line pumping station discharges directly to the ENPWJSA system at the Saw Mill Run pumping station owned by them. The Mermaid Run pumping station discharges flow to the Sheffield Drive meter chamber, which includes a small gravity flow area in addition to the flows from the Mermaid Run service area. Another small gravity flow area, serving primarily commercial offices, discharges through the Walton Road meter chamber.

4.4.2 Ambler Service Area

There are three small pumping stations in the service area tributary to the Ambler plant:

Pumping Station Name/Location	Capacity (gpm)	Metered (Yes/No)	Force Main Length (feet)	Force Main Diameter (inches)
Beale Road PS	200	No *	3,920	6
Butler Pike PS	54	No *	3,100	2½
Twp. Line Road PS		No *		1½

* Pump operating times are recorded daily.

Beale Road pumping station is located at the end of Beale Road, east of Penllyn Pike, in the Willow Run basin of the Township. The station had been an ejector type with a rated capacity of 80 gpm. Construction was initiated in August 2002 to replace the old ejector station with a submersible pumping station. The current submersible station has a capacity of 200 gpm and was placed in operation in March 2003. The station discharges wastewater through a 6-inch force main to a gravity to a sewer in Skippack Pike, east of Penllyn Pike. The sewer in Skippack Pike flows to the Prophecy Creek interceptor sewer. The station is not metered, but motor starts are recorded by a counter.

Butler Pike pumping station is located on Butler Pike between Stenton Avenue and Norristown Road and began operation in February 2000. The station discharges wastewater to a sewer in Norristown Road. The station serves the Devonshires development and has a capacity of 54 gpm with one of the two pumps operating. The station is not metered, but operating times are recorded.

Township Line Road pumping station is located on Township Line Road east of Plymouth Road and began operation in June 2001. The station is a submersible grinder pump station that discharges wastewater through a 1½-inch force main to a sewer in Lantern Lane. The station serves roughly 10 houses in both Whitpain Township and bordering Lower Gwynedd Township. The station is not metered, but operating times are recorded.

4.5 ON-LOT DISPOSAL SYSTEMS

There are only a relatively few isolated residences that are served by on-lot disposal systems. The Township is almost entirely served by public sanitary sewers.

The isolated sections of the Township served by on-lot disposal systems (OLDS) include:

a. Morris Road near North Wales Road, including roughly five residences and two commercial establishments (Continuous Farms and Reit Fuel Oil)
b North Wales Road and Skippack Pike, including roughly ten residences and two commercial establishments (Miller Contractors and Pileggi Trucking)
c. North Wales Road north of Township Line Road, including roughly five residences
d. Holly, Barby and Plymouth Roads, located southwest of the intersection of Morris Road and Penllyn Pike, which include roughly twenty-five residences
e. Morris Road and Mathers Mill Road, including roughly twenty residences
f. Butler Pike, south of Norristown Road, which includes roughly five residences
g. Butler Pike, between Stenton Avenue and Township Line Road, which includes roughly six residences

The first three OLDS sections are located within the ENPWJSA sewerage service area; the next four sections are located within the Ambler service area; and the last section is located within the Whitemarsh service area.

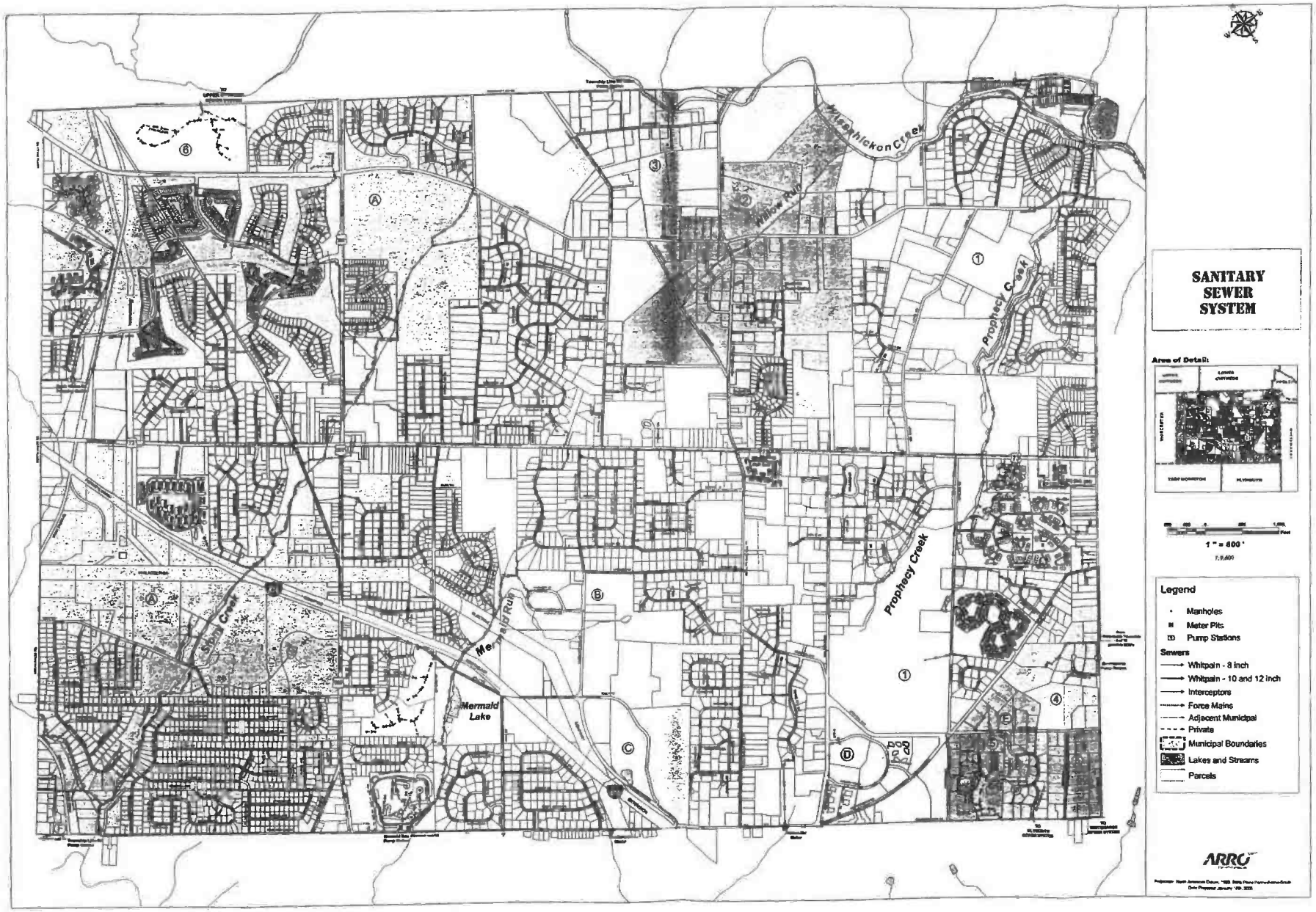
The following tabulation indicates the number of properties that continue to rely on private OLDS for service as of December 2005. The total represents less than 5 percent of the total Township properties.

Sewer Service Area	Properties Served by OLDS
ENPWJSA	135
Ambler	156

There have been no indications of OLDS malfunctions. However, Township policy has been to extend public sewerage service to OLDS areas as the opportunity and need present. For example, the Township extended public sewers to roughly 55 residences along Plymouth Road and Lantern Lane in 2000.

TABLE 4-1
SUMMARY OF SEWER LENGTHS

Service Area/Basin	Connections (parcels)	Sewer Length (feet), according to Pipe Diameter							No. of Manholes
		8	10	12	15	18	24	Total	
EAST NORRITON-PLYMOUTH-WHITPAIN JOINT SEWER AUTHORITY									
Stony Creek Basin (A)	3,080	221,936	2,809	7,230	3,270	6,310	640	242,195	1,104
Mermaid Run Basin (B)	1,567	109,946	2,580	1,000	8,619	4,366	0	126,511	514
Sheffield Drive Meter (C)	41	5,890	0	0	0	1,650	0	7,540	26
Walton Road Meter (D)	217	28,587	0	0	0	0	0	28,587	123
Narcissa Rd PS (E)	35	6,978	0	0	0	0	0	6,978	30
ENPWJSA Total	**4,940**	373,337	5,389	8,230	11,889	12,326	640	**411,811**	**1,797**
AMBLER JOINTURE									
Prophecy Creek Basin (1)	1,519	122,170	5,877	1,758	4,190	11,861	0	145,856	604
Willow Run Basin (2)	130	12,431	0	0	0	0	0	12,431	44
Wissahickon Creek Basin (3)	21	7,010	0	0	0	0	0	7,010	31
Ambler Total	**1,670**	141,611	5,877	1,758	4,190	11,861	0	**165,297**	**679**
WHITEMARSH	34	7,474	0	0	0	0	0	7,474	34
UPPER GWYNEDD	79	10,777	0	0	0	0	0	10,777	58
TOWNSHIP TOTALS	**6,723**	533,199	11,266	9,988	16,079	24,187	640	**595,359** 112.8 miles	**2,568**


Wissahickon Creek
Willow Run
Prophecy Creek
Prophecy Creek
Mermaid Run
Shaw Creek
Mermaid Lake
SANITARY SEWER SYSTEM
Area of Detail:
1 " = 600 '
Legend
Manholes
Meter Pits
Pump Stations
Sewers
Whitpain - 8 inch
Whitpain - 10 and 12 inch
Interceptors
Force Mains
Adjacent Municipal
Private
Municipal Boundaries
Lakes and Streams
Parcels
ARRO

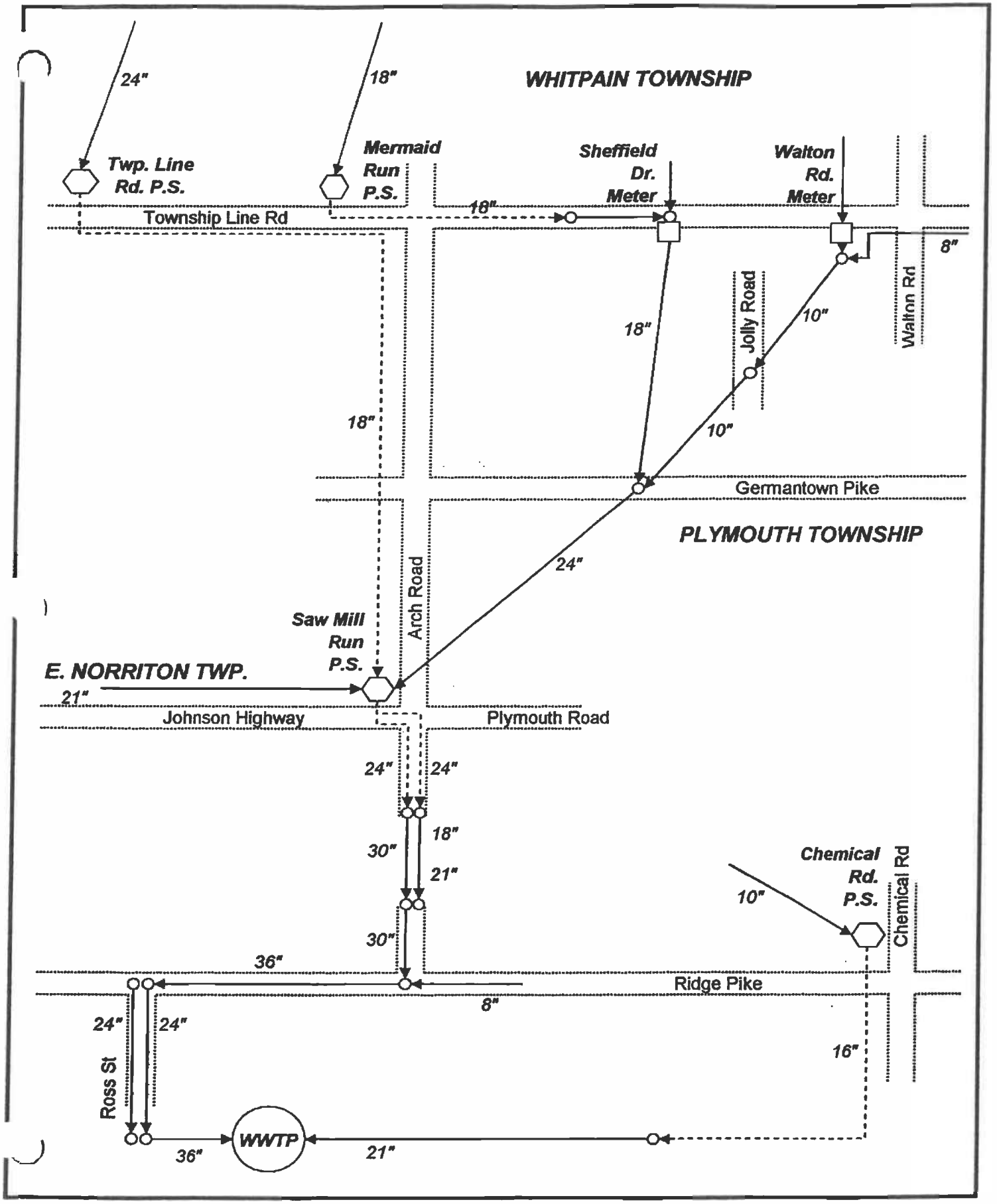


FIGURE 4-2
RELATION OF WHITPAIN AND E.N.P.W.J.S.A. SEWER SYSTEMS

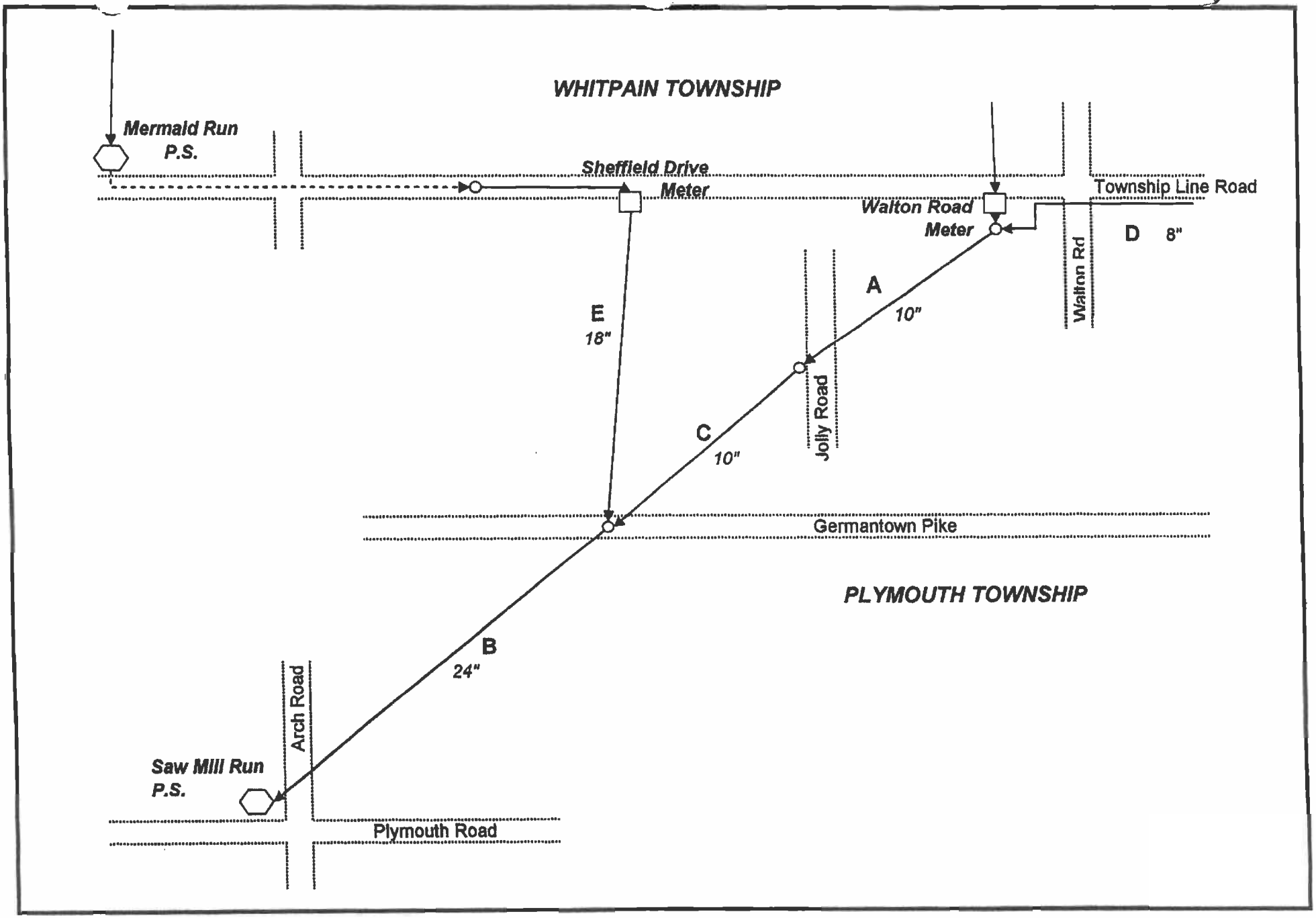


FIGURE 4-3: SCHEMATIC OF PLYMOUTH (SAW MILL) INTERCEPTOR

TABLE 4-2
SUMMARY OF CURRENT PLYMOUTH-WHITPAIN TRANSPORTATION AGREEMENT CONDITIONS
INCLUDING AMENDMENTS NO. 3 AND 5

Sewer No.	Name	Geographic Reference	Whitpain Portion per Agreement: Quant. (mgd)	Max. Rate (gpm)	Share (%)	Pipe: Diam. (inches)	Type	Length (feet)	Limiting Slope	Capacity (mgd)	Capacity (gpm)
		1,070' above Walton Rd.									
D	Township Line Rd.	Twp. Line Rd.									
A	Walton branch	Jolly Road	0.1	319	46.0%	10		2,770	*0.003*	0.776	539
C	Walton branch	Germantown Pk.	0.1	319	46.0%	10		4,150	*0.003*	0.776	539
		Twp. Line Rd.									
E	Sheffield branch	Germantown Pk.	1.9	2,840	74.5%	18	RCP	4,230	0.004	4.294	2,982
B	Saw Mill Interceptor	Arch Road	2.0	3,159	80.1%	24	RCP	5,650	*0.003*	8.009	5,562
	Pumping Station		3.1								

Notes:

1 Amendment No. 3 dated 24-Nov-80 contained following provisions:
Total Discharge limit was increased to Avg. = 2.70 mgd or 1/3 WWTP capacity = 3.1 mgd
Max. Rates (5 days/month for 5/12 months) were specified as follows:
Walton Road segment = 319 gpm
all other sources = 2,840 gpm

2 Amendment No. 5 dated 14-Feb-89 contained the following provisions:
Peak flow rates were specified as follows: **Sheffield** Meter discharges:
Design Peak Flow = 2,840 gpm
(2 hrs/day for 2/30 days) 3,100 gpm → commence corrective action
sewer overflow → impose moratorium on connections
Walton Meter discharges:
(3 hrs/day for 5/30 days) 360 gpm → prepare plans for corrective action
(3 hrs/day for 5/30 days) 400 gpm → commence work on corrective action
(1 hr/day for any 1 day) 440 gpm → impose moratorium on connections

3 Sewer Capacity is based on Manning roughness coefficient (n) = 0.013 and assumed slope of 0.003 for segments A, B, C

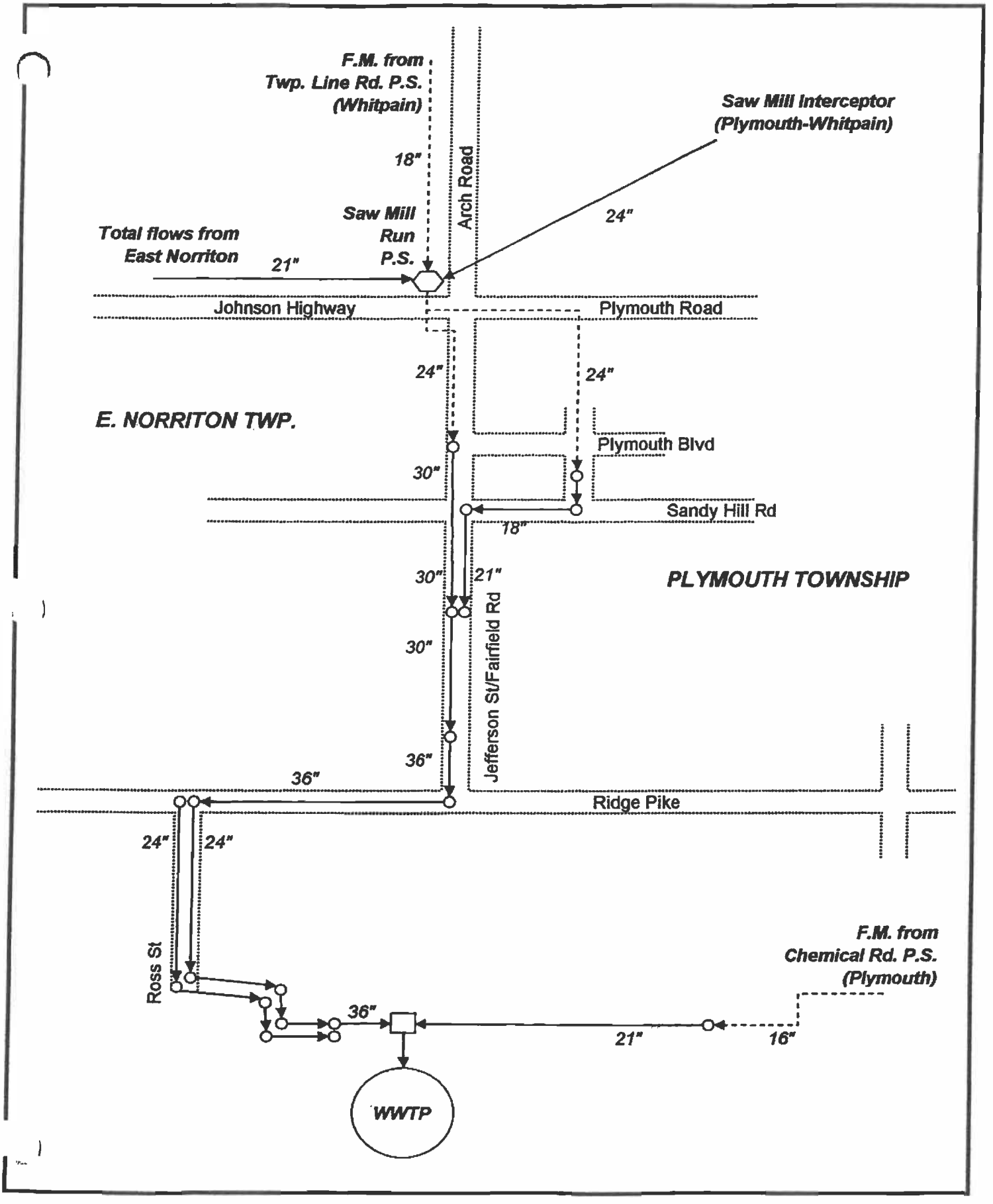


FIGURE 4-4
SCHEMATIC OF E.N.P.W.J.S.A. CONVEYANCE FACILITIES